55-1520-238-T

TECHNICAL MANUAL

AVIATION UNIT AND INTERMEDIATE TROUBLESHOOTING MANUAL

FOR

ARMY MODEL AH-64A HELICOPTER

VOLUME 1

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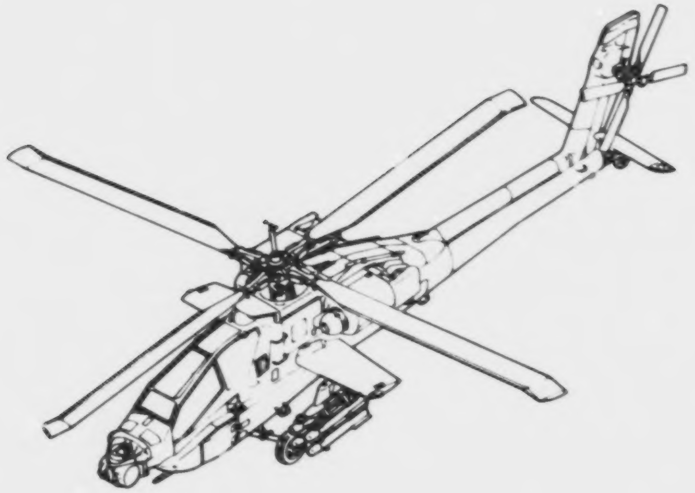

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Aviation Unit and Intermediate Troubleshooting Manual

FOR

ARMY MODEL
AH-64A HELICOPTER

VOLUME 1

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4-9 and 4-10	4-9 and 4-10
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8-75 and 8-76	8-75 and 8-76

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4-11 and 4-12	4-11 and 4-12
4-18.1 and 4-18.2	4-18.1 and 4-18.2
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1-2.1/1-2.2	1-2.1/1-2.2
1-15 and 1-16	1-15 and 1-16
1-21 blank/1-22	1-21 and 1-22
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vii through x	vii through x
xiii and xiv	xiii and xiv
1-3 and 1-4	1-3 and 1-4
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AH-64A Helicopter

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8-61 and 8-62	8-61 and 8-62

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AH-64A HELICOPTER

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Remove pages	Insert pages
ix through xii	ix through xii
xv through xviii	xv through xviii
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i through xiii/xiv	i through xiv
---	xv through xix/xx
1-11 through 1-20	1-11 through 1-20
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1-21 and 1-22	1-21 blank/1-22
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8-2.1 and 8-2.2	8-2.1 and 8-2.2
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8-72.1 and 8-72.2	8-72.1 and 8-72.2

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AH-64A HELICOPTER

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Remove pages	Insert pages
8-50.1 and 8-50.2	8-50.1 and 8-50.2
---	8-50.3 Blank/8-50.4
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AH-64A HELICOPTER

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Remove pages	Insert pages
-----	1-2.1/1-2.2
1-3 through 1-6	1-3 through 1-6
1-15 and 1-16	1-15 and 1-16
1-21 and 1-22	1-21 and 1-22
4-7 through 4-28	4-7 through 4-28
4-31 and 4-32	4-31 and 4-32
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8-69 through 8-72	8-69 through 8-72.2
8-73 and 8-74	8-73 and 8-74

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5-1 through 5-8	5-1 through 5-8
----	5-8.1/(5-8.2 blank)
5-9 and 5-10	5-9 and 5-10
(5-11 blank)/5-12	(5-11 blank)/5-12
5-13/(5-14 blank)	5-13 and 5-14
----	5-15/(5-16 blank)

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Warning 1 and Warning 2	Warning 1 and Warning 2
i thru viii	i thru viii
-----	1-2.1/1-2.2
1-3 and 1-4	1-3 and 1-4
-----	1-4.1/1-4.2
1-21 and 1-22	1-21 and 1-22
3-5 and 3-6	3-5 and 3-6
4-9 and 4-10	4-9 and 4-10
4-13/4-14	4-13/4-14
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8-69 thru 8-74	8-69 thru 8-74
8-79/8-80	8-79/8-80
~~Cover 1/2~~	~~Cover 1/2~~

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WARNING

The WARNINGS on this page are to notify you of operating or maintenance procedures, practices or conditions, which, if not strictly observed, could result in injury or death to personnel. These WARNINGS must be obeyed by all personnel using this Technical Manual.

WARNING

ELECTROMAGNETIC RADIATION

Do not stand in the direct path of an antenna when the applicable system power is on. Microwave radiation produces electrical and magnetic forces, and generates heat in the human body, with potentially dangerous effects. Microwave radiation may cause nausea. If you feel the slightest warming effect or nausea while near an antenna, move away quickly. Location of antennas emitting microwave radiation on this helicoper are:

- VHF-FM-AM antenna on the aft surface of the vertical stabilizer.
- VHF-FM-AM blade antenna on the bottom center fuselage directly forward of the doppler fairing.
- UHF-AM/lower IFF antenna on the bottom center fuselage directly aft of the doppler fairing.
- Upper IFF antenna on top of the fuselage area aft of the canopy.
- Radar jammer transmit antenna on top of the left side of the fuselage nose forward of the CPG station.
- Infrared (IR) jammer transmit antenna located behind the main rotor mast.

  Do not continuously look at this antenna for more than one minute at a distance of less than 3 feet. Avoid skin exposure to IR radiation for longer than 10 seconds at a distance less than 4 inches.

Before replacing any of the above antennas, remove electrical power from the system and tag the circuit breaker and/or the external power connector to prevent injury to personnel.

During operational check of the radar warning set, an active ground radar is used. Use care when activating and using the ground radar to avoid exposure to microwave radiation from the test antenna.

WARNING

NOISE

Personnel in the area of jet engine operation will wear approved ear protection to protect their hearing.

WARNING

ELECTRICAL POWER

Voltages used may cause arcing. Remove rings, watches, and other jewelry which may cause a shock/burn hazard.

Voltages used may cause severe shock or death on contact. Use caution to avoid contact with energized components.

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and 115 VAC are present. Failure to do so could result in death or serious injury.

When opening a circuit breaker during system checks, tag circuit breaker to prevent unforeseen closing, which may cause injury or death to personnel.

For artificial respiration, refer to FM21-11.

WARNING

PITOT TUBES

Do not touch pitot tubes when heating switch is on. Heaters in these tubes can cause serious burns. If burns occur, obtain medical help.

WARNING

The WARNINGS on this page are to notify you of operating or maintenance procedures, practices or conditions, which, if not strictly observed, could result in injury or death to personnel. These WARNINGS must be obeyed by all personnel using this Technical Manual.

WARNING

JET ENGINE FUEL

Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.

WARNING

GRAVITY REFUELING/DEFUELING OPERATIONS

Set REFUEL VALVE switch to OPEN during gravity refueling/defueling operations prior to opening fuel cell filler cap to prevent cap and/or fuel being forced out of filler neck by nitrogen inerting unit-pressurized air in fuel cell. Failure to do so may result in fuel spillage.

WARNING

CHECKING FUEL CROSSFEED/BOOST SYSTEM

Make sure all personnel are clear of aft deck and No. 1 and No. 2 engine nacelles before checking fuel crossfeed/boost system. Failure to do so may result in fire extinguishing agent being sprayed on personnel.

WARNING

FIRE EXTINGUISHING AGENT

Fire extinguishers are filled with a dangerous chemical. All persons must wear safety glasses when removing fire extinguishers. If extinguisher discharges, it can burn eyes and skin. Wash chemical off skin with water and get medical aid.

When using a fire extinguisher in a confined space, wear a respirator. If fire extinguisher is discharged, ventilate space as soon as possible. Serious personal injury could occur if vapors are inhaled.

WARNING

SOLVENTS AND CHEMICALS (INCLUDING HYDRAULIC FLUID)

Solvents and chemicals, including hydraulic fluid, are flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Use solvents and chemicals only with adequate ventilation. If solvents or chemicals touch the eyes or skin, flush with water and seek medical aid as required.

WARNING

HYDRAULIC PRESSURE

Hydraulic system operates at 3000 psi. Do not perform maintenance on system until hydraulic pressure is removed from helicopter. Be certain that trapped hydraulic pressure is released before loosening any connections. Failure to do so could result in death or serious injury. If injury occurs, get medical aid immediately.

WARNING

PRESSURIZED AIR

The sudden release of pressurized air can injure personnel. To avoid pressurized lines in the nitrogen inerting system, remove pressurized air before removing electrical power. Failure to do so may cause injury to personnel.

WARNING

CONTROL MOVEMENTS

Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands. If injury occurs, get immediate medical aid.

TECHNICAL MANUAL)
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No. 55-1520-238-T-1)

AVIATION UNIT AND INTERMEDIATE TROUBLESHOOTING MANUAL
FOR
ARMY MODEL
AH-64A HELICOPTER

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 15 December 1985

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in back of this manual direct to: Commander, U.S. Army Aviation System Command, ATTN: AMSAV-MPSD, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST

NOTE

Common failure symptoms are listed in alphabetical order. Following each symptom, are listed the systems which may be the cause of the problem and the chapters of this manual to be referenced to troubleshoot the symptom. Chapters 1 through 8 are contained in volume 1; chapter 9 is contained in volume 2; and chapters 10 through 16 are contained in volume 3.

Symptom	System	Refer to Chapter
Aft avionics bay fan - does not operate.	Environmental Control Electrical	13 9
Anti ice valves - do not close (ECS air shutoff).	Utility Electrical	12 9
APU - does not run (FD/LS displays **APU NO-GO OVERSPEED**).	APU Electrical	15 9
APU - does not run (FD/LS displays **APU NO-GO OVERTEMP**).	APU Electrical	15 9
APU - does not run (FD/LS displays **APU NO-GO PTO CLUTCH**).	APU Electrical	15 9
APU circuit breaker - does not stay closed.	APU Electrical	15 9
APU FIRE PULL switch handle - does not light.	Utility Electrical	12 9
APU FIRE PULL switch handle - does not light with **FIRE TEST** switch in **DET 1** position.	Utility Electrical	12 9
APU fuel shutoff valve - does not close with **APU FIRE PULL** switch handle pulled.	APU Electrical	15 9
APU fuel shutoff valve - does not close with **START/RUN/OFF** switch set to **OFF**.	APU Electrical	15 9
APU fuel shutoff valve - does not close with **START/RUN/OFF** switch set to **RUN**.	APU Electrical	15 9
APU HOLD circuit breaker (CB10) - does not stay closed or continuity to **BTL DISCHARGE/APU** panel does not exist between A76J1-h and -B.	Electrical APU	9 15
APU HOLD circuit breaker - does not stay closed with **START/RUN/OFF** switch set to **RUN**.	APU Electrical	15 9
APU HOLD circuit breaker - does not stay closed.	APU Electrical	15 9
APU HOLD circuit breaker - does not stay closed with **START/RUN/OFF** switch set to **OFF**.	APU Electrical	15 9
APU ON indicator - is not lighted 60 seconds after APU start.	APU Electrical	15 9
APU start sequence - does not begin.	APU Electrical	15 9
ASE AC circuit breaker (CB18) does not stay closed or 115 VAC to **ASE** actuators is not present at A76P1-54.	Electrical Flight Controls	9 11
ASE AC circuit breaker - does not stay closed.	Flight Controls Electrical	11 9
ASE DC circuit breaker (CB28) - does not stay closed or 28 VDC to **ASE** panel is not present at P1-34.	Electrical ASE	9 11

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
ASE DC circuit breaker - does not stay closed.	Flight Controls Electrical	11 9
ASE panel edge-light - does not light.	Flight Controls Electrical	11 9
ASE panel **PITCH, ROLL, YAW,** and **ATTD/HOVER HOLD** switches - do not stay on.	Flight Controls Electrical	11 9
Audio tone - not heard in crew stations (airspeed transducers output differential abnormal).	Flight Controls Electrical	11 9
AUX PWR indicator on DIM/TEST panel - does not light.	Engine Instruments Electrical	8 9
BLADE ANTI-ICE FAIL indicator - does not light or does not extinguish.	Utility Electrical	12 9
BOOST PMP ON indicator - does not light (engine No. 1 or No. 2 **START** switch set to **START**).	Fuel Power Plants	10 4
BOOST PMP ON indicator - is lighted with **BOOST** switch **ON.**	Fuel Electrical	10 9
Both vertical scales on pilot **FUEL LBX10** indicator do not show increase with **EXT TK** switch set to **ON.**	Fuel Hydraulic	10 7
BTL DISCHARGE/APU panel edge-light - is not lighted.	APU Electrical	15 9
CANOPY ANTI ICE NO-GO PUT HEATER SWITCH OFF - appears or should have appeared on HOD.	Utility Electrical MRTU Type I	12 9
CANOPY ANTI ICE NO-GO CHECK HTR SWITCH - appears or should have appeared on HOD.	Utility Electrical	12 9
Canopy windshield heaters - do not heat.	Utility Electrical	12 9

Symptom	System	Refer to Chapter
CHIPS MAIN XMSN indicator - lights.	Drive Electrical	6 9
CHIPS NOSE GRBX 1 indicator - lights.	Drive Electrical	6 9
CHIPS NOSE GRBX 2 indicator - lights.	Drive Electrical	6 9
CPG **AIRSPEED** indicator edge-lighting - does not come on.	Flight Instruments Electrical	8 9
CPG **AUX/ANTI** ice panel edge-light - does not brighten.	Utility Electrical	12 9
CPG barometric altimeter edge-lighting - does not light.	Flight Instruments Electrical	8 9
CPG clock edge-lighting - does not light.	Miscellaneous Instruments Electrical	8 9
CPG **ENG INST** circuit breaker - does not stay closed.	Engine Instruments Electrical	8 9
CPG **ENG-RTR** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
CPG engine No. 1 power lever - cannot be advanced to **LOCKOUT**.	Power Plants Electrical	4 9
CPG engine No. 2 power lever - cannot be advanced to **LOCKOUT**.	Power Plants Electrical	4 9
CPG **FIRE APU** indicator - does not light with **FIRE TEST** switch in DET 1 position.	Utility Electrical	12 9
CPG fire extinguisher panel edge-light - does not brighten.	Utility Electrical	12 9
CPG fuel panel edge-lights - do not light.	Fuel Electrical	10 9
CPG **HIGH RPM ROTOR** indicator - does not light at **104** percent N_R	Drive Electrical	6 9

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer t Chapte
CPG **LOW RPM ROTOR** indicator - does not light.	Drive Electrical	6 9
CPG **LOW RPM ROTOR** indicator - does not light with electrical power applied and all power plants off.	Drive Electrical	6 9
CPG SDD panel edge-lighting - does not light.	Engine Instruments Electrical	8 9
CPG **ST JTSN** switch - no emergency jettison control voltage.	Mission Equipment Electrical	16 9
CPG **ST JTSN** switch - no primary jettison control voltage.	Mission Equipment Electrical	16 9
CPG **TORQUE** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
CPG **VERTICAL SPEED** indicator edge-lighting - does not light.	Flight Instruments Electrical	8 9
CPG windshield wiper - does not operate at low speed.	Utility Electrical	12 9
CPG/PLT **STAB POS** indicators - do not indicate full nose up position (9 ±2 degrees), or **OFF** flag appears.	Flight Controls Electrical	11 9
Crew stations - receive no or low air flow.	Environmental Control Electrical	13 9
Defog shutoff valve - does not operate.	Utility Electrical	12 9
Dual hydraulic pressure indicator edge-light does not light.	Primary Hydraulic Electrical	7 9
ECS AFT FAN circuit breaker (CB75) - does not stay closed.	Environmental Control Electrical	13 9

Symptom	System	Refer to Chapter
ECS AFT FAN circuit breaker (CB75) - does not stay closed or 115 VAC to electrical power center and aft avionics fans is not present at P2-A, -B, -C.	Electrical Environmental Control	9 13
ECS airflow does not decrease - with fuel BST circuit breaker open and No. 1 engine operating.	Pressurized Air Electrical	7 9
ECS airflow present with NO. 1 ENG START switch at IGN OVRD.	Power Plants Environmental Control	4 13
ECS airflow present with NO. 2 ENG START switch at IGN OVRD.	Power Plants Environmental Control	4 13
ECS ANTI-ICE circuit breaker - does not stay closed (PITOT ICE DET AD SNSR switch - ON).	Utility Electrical	12 9
ECS BLADE DEICE circuit breaker (CB85) - does not stay closed or 28 VDC to blade deice contactor is not present at P1-53.	Electrical Ice Detecting	9 13
ECS BLADE DEICE circuit breaker - does not stay closed.	Utility Electrical	12 9
ECS BLADE DEICE CONTR circuit breaker(CB83) - does not stay closed or 28 VDC to rotor blade deice controller is not present at P1-14.	Electrical Ice Detecting	9 13
ECS BLADE DEICE CONTR circuit breaker - does not stay closed.	Utility Electrical	12 9
ECS CAB circuit breaker (CB76) - does not stay closed.	Environmental Control Electrical	13 9
ECS CAB circuit breaker (CB76) - does not stay closed or 28 VDC to AUX panel is not present at A76P1-2.	Electrical Anti-Ice	9 12

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter·
ECS CANOPY ANTI ICE circuit breaker (CB78) - does not stay closed or 115 VAC to canopy temperature control is not present at P2-c, -d, -e.	Electrical Environmental Control	9 13
ECS CANOPY ANTI ICE circuit breaker - does not stay closed.	Utility Electrical	12 9
ECS CANOPY ANTI ICE CONTR circuit breaker (CB70) - does not stay closed or 28 VDC to anti ice panel is not present at A76P1-3.	Electrical Canopy Anti-Ice	9 12
ECS CANOPY ANTI ICE CONTR circuit breaker - does not stay closed.	Utility Electrical	12 9
ECS ENG ANTI ICE circuit breaker (CB67) - does not stay closed or 28 VDC to anti ice panel is not present at A76P1-4.	Electrical Engine Anti-Ice	9 12
ECS ENG ANTI ICE circuit breaker - does not stay closed (ENG INLET switch - OFF).	Utility Electrical	12 9
ECS ENG ANTI ICE circuit breaker - does not stay closed (PITOT ICE DET AD SNSR switch - ON).	Utility Electrical	12 9
ECS FAB FANS circuit breaker (CB88) - does not stay closed.	Environmental Control Electrical	13 9
ECS FAB FANS circuit breaker (CB88) - does not stay closed or 115 VAC to FAB FAN relays is not present at P2-K, -L, -M.	Electrical Environmental Control	9 13
ECS ICE DET circuit breaker (CB68) - does not stay closed or 28 VDC to ice detector signal processor is not present at P1-47.	Electrical Environmental Control	9 13
ECS ICE DET circuit breaker - does not stay closed.	Utility Electrical	12 9
ECS ICE DET HTR circuit breaker (CB212) - does not stay closed or 115 VAC is not present at A76P1-9.	Electrical Utility	9 12

Symptom	System	Refer to Chapter
ECS ICE DET HTR circuit breaker - does not stay closed (**PITOT ICE DET AD SNSR** switch - **OFF**).	Utility Electrical	12 9
ECS L NOSE GRBX HTR circuit breaker (CB38) - does not stay closed or 115 VAC is not present at A76P2-m, -n, -p.	Electrical Anti-Ice	9 12
ECS L NOSE GRBX HTR circuit breaker - does not stay closed (**ENG INLET** switch - **OFF**).	Utility Electrical	12 9
ECS R NOSE GRBX HTR circuit breaker - does not stay closed (**ENG INLET** switch - **OFF**).	Utility Electrical	12 9
ECS R NOSE GRBX HTR circuit breaker - does not stay closed or 115 VAC is not present at A76P2-q, -r, -s.	Electrical Utility	9 12
ECS WSHLD WPR circuit breaker (CB71) - does not stay closed or 28 VDC to windshield wiper motors is not present at A76P2-b.	Electrical Windshield Wiper	9 12
ECS WSHLD WPR circuit breaker - does not stay closed.	Utility Electrical	12 9
Electrical power distribution box fan - does not operate.	Environmental Control Electrical	13 9
EMERG BATT ENG INST circuit breaker (CB31) - does not stay closed or continuity to signal data converter does not exist between J4-C and J1-8, -10.	Electrical Power Plants	9 4
EMERG HYD circuit breaker (CB35) - does not stay closed.	Utility Hydraulic Electrical	7 9
EMERG HYD circuit breaker (CB35) - does not stay closed or 28 VDC to primary and utility hydraulic manifolds is not present at A76J1-k, -m.	Electrical Hydraulic	9 7
EMERG PWR indicator - is not lighted with **CKT B** switch set to **ENG 1**.	Power Plants Electrical	4 9
EMERG PWR indicator - is not lighted with **CKT B** switch set to **ENG 2**.	Power Plants Electrical	4 9
Emergency hydraulic flight controls do not function properly.	Utility Hydraulic Electrical	7 9

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
Emergency hydraulic panel edge-light - does not come on.	Utility Hydraulic Electrical	7 9
ENG 1 ANTI ICE indicator on pilot caution/warning panel - lights (ENG INLET switch - OFF).	Utility Electrical	12 9
ENG 1 and ENG 2 ANTI ICE indicators on pilot caution/warning panel - remain lighted (ENG INLET switch - ON, ENG START switch No. 1 or No. 2 set to IGN OVRD).	Utility Power Plants	12 4
ENG 1 and ENG 2 anti-ice valves - do not close (ANTI-ICE OFF).	Utility Electrical	12 9
ENG 1 ANTI ICE indicator lights (ANTI-ICE ON - engines running).	Utility Electrical	12 9
ENG 1 ANTI ICE indicator on pilot C/W panel does not light (ANTI-ICE ON - engine not running).	Utility Electrical	12 9
ENG 1 ANTI ICE and ENG 2 ANTI ICE indicators on pilot caution/warning panel - light (ENG INLET switch - OFF).	Utility Electrical	12 9
ENG 1 ANTI ICE and ENG 2 ANTI ICE indicators on pilot caution/warning panel - light (ENG INLET switch - ON).	Utility Electrical	12 9
ENG 1 ANTI ICE indicator on pilot caution/warning panel - does not light (ENG INLET switch - ON, engine not running).	Utility Electrical	12 9
ENG 1 nose gearbox fairing - does not get hot (ENG INLET switch - ON).	Utility Electrical	12 9
ENG 2 ANTI ICE indicator lights (ANTI-ICE ON - engines running).	Utility Electrical	12 9
ENG 2 ANTI ICE indicator on pilot caution/warning panel does not light (ANTI-ICE ON - engine not running).	Utility Electrical	12 9

Symptom	System	Refer to Chapter
ENG 2 ANTI ICE indicator on pilot caution/warning panel - does not light (**ENG INLET** switch - **ON**, engine not running).	Utility Electrical	12 9
ENG 2 ANTI ICE indicator on pilot caution/warning panel - light (**ENG INLET** switch - **OFF**).	Utility Electrical	12 9
ENG CUT circuit breaker - does not stay closed.	Drive Electrical Power Plants	6 9 4
ENG CUT circuit breaker (CB60) - does not stay closed or 28 VDC to pilot and CPG collective sticks is not present at A76J1-b.	Electrical Power Plants	9 4
ENG ICE indicator on pilot C/W panel - does not light (icing severity meter indicates severe icing).	Utility Electrical	12 9
ENG INLET ENG 1 and **ENG 2** advisory lights on pilot **ANTI-ICE** panel - do not light (**ENG INLET** switch - **OFF**, **PITOT ICE DET ASD SNSR** switch - **OFF**).	Utility Electrical	12 9
ENG INST circuit breaker (CB17) - does not stay closed or 28 VDC to signal data converter is not present at A76J1-L, -M.	Electrical Engine Instruments	9 8
ENG LVR circuit breaker (CB16) - does not stay closed or 28 VDC to pilot fire extinguish panel is not present at A76J1-K.	Electrical Fire Detection	9 12
ENG START 2 indicator - is not lighted with engine 2 started.	Power Plants Electrical	4 9
ENG START circuit breaker (CB58) - does not stay closed.	Power Plants Drive Electrical	4 6 9

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
ENG START circuit breaker (CB58) does not stay closed or 28 VDC to pilot power quadrant is not present at A76J1-c, -X.	Electrical Power Plants	9 4
ENG START ENG 1 indicator - is not lighted with engine 1 started.	Power Plants Electrical	4 9
ENG WARN circuit breaker (CB52) - does not stay closed or 28 VDC to engine out warning unit is not present at A76J1-N.	Electrical Power Plants	9 4
ENG WARN circuit breaker - does not stay closed (effective Serial No. 83-23805 and subsequent).	Flight Controls Electrical	11 9
Engine 1 does not accelerate to or remain between 23 and 25 percent **NG** in **IGN OVRD.**	Power Plants Electrical	4 9
Engine 1 fuel crossfeed/shutoff valve - does not shut off when pilot **ENG 1 FIRE PULL** switch handle is pulled.	Utility Electrical Fuel	12 9 10
Engine 1 louvers - do not close when pilot **ENG 1 FIRE PULL** switch handle is pulled.	Utility Electrical Power Plants	12 9 4
ENGINE 1 OUT indicators - are lighted with engine 1 running.	Power Plants Electrical	4 9
Engine 2 does not accelerate to or remain between 23 and 25 percent **NG** in **IGN OVRD.**	Power Plants Electrical	4 9
Engine 2 fuel crossfeed/shutoff valve - does not shut off when CPG **ENG 2 FIRE PULL** switch handle is pulled.	Utility Electrical	12 9

Symptom	System	Refer to Chapter
Engine 2 louvers - do not close when CPG **ENG 2 FIRE PULL** switch handle is pulled.	Utility Electrical	12 9
Engine 2 louvers - do not close when pilot **ENG 2 FIRE PULL** switch handle is pulled.	Utility Power Plants	12 4
Engine 2 nose gearbox fairing - does not get hot (**ENG INLET** switch - **ON**).	Utility Electrical	12 9
ENGINE ICE indicator on pilot C/W panel - lights.	Utility Electrical	12 9
EXT EMP indicator is lighted with **EXT TK** switch set to **OFF**.	Fuel Electrical	10 9
FAB normal fans - do not operate.	Environmental Control Electrical	13 9
False engine out warning occurs inflight (single engine maneuver at high power setting and **Np** less than **89** percent).	Electrical Engine Instruments	9 8
FD/LS **NGB1** oil temperature display - does not indicate **-31 degrees C.**	Drive Electrical	6 9
FD/LS **NGB2** oil temperature display - is not **-31 degrees C.**	Drive Electrical	6 9
FD/LS **XMN1** oil temperature display - is not **-31 degrees C.**	Drive Electrical	6 9
FD/LS **XMN2** oil temperature display - is not **-31 degrees C.**	Drive Electrical	6 9
FIRE DETR APU circuit breaker (CB11) - does not stay closed or 28 VDC to APU flame detector is not present at A76J1-E.	Electrical Fire Detection	9 12

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
FIRE DETR APU circuit breaker - does not stay closed.	Utility Electrical	12 9
FIRE DETR ENG 1 circuit breaker (CB12) - does not stay closed or 28 VDC to engine 1 flame detector is not present at A76J1-F.	Electrical Fire Detection	9 12
FIRE DETR ENG 1 circuit breaker - does not stay closed.	Utility Electrical	12 9
FIRE DETR ENG 2 circuit breaker (CB13) - does not stay closed or 28 VDC to engine 2 flame detector is not present at A76J1-G.	Electrical Fire Detection	9 12
FIRE DETR ENG 2 circuit breaker - does not stay closed.	Utility Electrical	12 9
FIRE EXTGH APU circuit breaker (CB26) - does not stay closed or 28 VDC to BTL DISCHARG/APU panel is not present at A76J1-J.	Electrical Fire Detection	9 12
FIRE EXTGH APU circuit breaker (CB26) - does not stay closed with fire bottle switch set to PRI and **APU FIRE PULL** switch handle pulled.	Utility Electrical	12 9
FIRE EXTGH circuit breaker (CB15) - does not stay closed.	Utility Electrical	12 9
FIRE EXTGH CPG circuit breaker (CB15) - does not stay closed or 28 VDC to CPG fire extinguish panel is not present at A76J1-H.	Electrical Fire Detection	9 12
FIRE EXTGH PLT circuit breaker (CB25) - does not stay closed.	Utility Electrical	12 9
FIRE EXTGH PLT circuit breaker (CB25) - does not stay closed or 28 VDC to pilot fire extinguish panel is not present at A76J1-D.	Electrical Fire Detection	9 12
Force trim - does not disengage.	Flight Controls Electrical	11 9

Symptom	System	Refer to Chapter
Force trim - does not engage.	Flight Controls Electrical	11 9
FUEL APU circuit breaker (CB9) - does not stay closed or 28 VDC to ground service utility receptacle is not present at A76J1-z.	Electrical Fuel	9 10
FUEL APU circuit breaker - does not stay closed.	APU Electrical	15 9
FUEL BOOST switch - does not stay on with **CROSSFEED** switch set to **AFT TK.**	Fuel Electrical	10 9
FUEL BST circuit breaker (CB57) - does not stay closed or 28 VDC to fuel pressure switch is not present at P1-31, -48.	Electrical Fuel	9 10
FUEL BST circuit breaker - does not stay closed.	Pressurized Air Electrical Fuel APU	7 9 10 15
FUEL BST circuit breaker - does not stay closed.	Fuel Electrical	10 9
FUEL BST circuit breaker - does not stay closed.	APU Hydraulic Fuel	15 7 10
FUEL BST circuit breaker - does not stay closed with CPG **FUEL** panel **ORIDE** switch at **CPG.**	Fuel Electrical	10 9
Fuel does not transfer - with No. 1 engine bleed air supplying PAS manifold.	Pressurized Air Fuel	7 10
FUEL FILL circuit breaker (CB32) - does not stay closed or continuity to refuel panel does not exist between A76J1-h and -A.	Electrical Fuel	9 10
FUEL FILL circuit breaker - does not stay closed with **LVL CONT VALVE** switches set to open.	Fuel Electrical	10 9

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
FUEL LOW AFT indicator - is lighted with pilot **FUEL LBX10** indicator **AFT** vertical display indicating between 24 and 26.	Fuel Electrical	10 9
FUEL LOW FWD indicator - is lighted with pilot **FUEL LBX10** indicator **FWD** vertical display indicating more than 22.	Fuel Electrical	10 9
FUEL TRANS circuit breaker - does not stay closed.	Fuel Electrical	10 9
FUEL TRANS circuit breaker - does not stay closed with **ORIDE** switch at **CPG**.	Fuel Electrical	10 9
FUEL VLV ACTR circuit breaker (CB14) - does not stay closed or 28 VDC to pilot fire extinguisher panel is not present at A76J1-C.	Electrical Fuel	9 10
FUEL XFEED circuit breaker (CB55) - does not stay closed or 28 VDC to engine 1 and 2 fuel valve actuators is not present at P1-32.	Electrical Fuel	9 10
FUEL XFEED circuit breaker - does not stay closed.	Fuel Electrical	10 9
Ground utility service receptacle - does not have AC power.	Electrical Fuel	9 10
HIGH RPM ROTOR indicator - lights.	Drive Electrical	6 9
HOD **NGB1** reading - displays **140 DEGREES C** or higher oil temperature.	Drive Electrical	6 9
HOD **NGB2** reading - displays **140 DEGREES C** or higher oil temperature.	Drive Electrical	6 9

Symptom	System	Refer to Chapter
HOD **XMN1** reading - displays **140 DEGREES C** or higher oil temperature.	Drive Power Plants DASEC	6 9 11
HOD **XMN2** reading - displays **140 DEGREES C** or higher oil temperature.	Drive Power Plants DASEC	6 4 11
ICE DETECTOR CONTROLLER NO-GO FIREWALL LH SIDE appears on HOD.	Utility Electrical	12 9
JETT circuit breaker (CB34) - does not stay closed or 28 VDC to pilot and CPG collective stick **ST JTSN** switch is not present at A76J1-P, -R.	Electrical Stores Jettison	9 16
JETT circuit breaker - does not stay closed.	Mission Equipment Electrical	16 9
Left FAB standby fan - does not operate.	Environmental Control Electrical	13 9
Left wing pitot tube heater - does not heat.	Utility Electrical	12 9
LOW RPM ROTOR audio warning - is not heard in either pilot or CPG headset.	Electrical Drive	9 6
LOW RPM ROTOR indicators - remain lighted above 93 percent N_R.	Drive Electrical	6 9
MISSION ARM CONTR circuit breaker - does not stay closed.	Mission Equipment Electrical	16 9
MISSION EL AC circuit breaker - does not stay closed.	Mission Equipment Electrical	16 9
MISSION EL DC circuit breaker - does not stay closed.	Mission Equipment Electrical	16 9
MISSION JETT circuit breaker (CB89) - does not stay closed or 28 VDC to stores **JETT** panel is not present at P1-18.	Electrical Stores Jettison	9 16

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
MISSION JETT circuit breaker - does not stay closed.	Mission Equipment Electrical	16 9
MISSION PEN AIDS CONTR circuit breaker (CB49) - does not stay closed or 28 VDC to radar and IR jammer controls is not present at P1-49.	Electrical Fuel	9 10
NAV AIR DATA DC circuit breaker - does not stay closed (**PITOT ICE DET AD SNSR** switch - **ON**).	Utility Electrical	12 9
Nitrogen inerting system - is not operating.	Fuel Electrical	10 9
No. 1 engine fuel valve indicator - does not indicate **CLOSED**.	Fuel Electrical Utility	10 9 12
No. 1 engine fuel valve indicator - does not move to **AFT**.	Fuel Electrical	10 9
No. 1 engine fuel valve indicator - does not move to **AFT** with **ORIDE** switch at **CPG**.	Fuel Electrical	10 9
No. 1 engine fuel valve indicator - does not move to **CLOSED** with CPG **ENG 1 FIRE PULL** switch handle pulled.	Fuel Utility	10 12
No. 1 engine fuel valve indicator - does not move to **FORWARD**.	Fuel Electrical	10 9
No. 1 engine fuel valve indicator - does not move to forward with CPG **ENG 1 FIRE PULL** switch handle pushed.	Fuel Utility	10 12
No. 1 engine fuel valve indicator - does not move to **FORWARD** with **ORIDE** switch at **CPG**.	Fuel Electrical	10 9
No. 1 engine fuel valve indicator - does not move to **NORMAL**.	Fuel Electrical	10 9

Symptom	System	Refer to Chapter
No. 1 engine fuel valve indicator - does not move to **NORMAL** with **ORIDE** switch at **CPG**.	Fuel Electrical	10 9
No. 2 engine fuel crossfeed/shutoff valve indicator - does not indicate closed with **ENG 2** switch **OFF**.	Fuel Electrical Utility	10 9 12
No. 2 engine fuel valve indicator - does not move to **AFT** with **ORIDE** switch at **CPG**.	Fuel Electrical	10 9
No. 2 engine fuel valve indicator - does not move to **CLOSED** with **CPG ENG 2 FIRE PULL** switch handle pulled.	Fuel Utility	10 12
No. 2 engine fuel valve indicator - does not move to **FORWARD**.	Fuel Electrical	10 9
No. 2 engine fuel valve indicator - does not move to **FORWARD** with CPG **ENG 2 FIRE PULL** switch handle pushed.	Fuel Utility	10 12
No. 2 engine fuel valve indicator - does not move to **NORMAL**.	Fuel Electrical	10 9
No. 2 engine fuel valve indicator - does not move to **NORMAL** with **ORIDE** switch at **CPG**.	Fuel Electrical	10 9
OIL BYP PRI HYD caution light is on.	Primary Hydraulic Electrical	7 9
OIL BYP UTIL HYD caution light is on.	Utility Hydraulic Electrical	7 9
OIL HOT MAIN XMSN 1 indicator - is lighted when HOD displays high **XMN1** oil temperature.	Drive Electrical	6 9
OIL HOT MAIN XMSN 1 indicator - is lighted when HOD displays normal **XMN1** oil temperature.	Drive Electrical Power Plants DASEC	6 9 4 11

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
OIL HOT MAIN XMSN 1 indicator - lights.	Drive Electrical	6 9
OIL HOT MAIN XMSN 2 indicator - is lighted when HOD displays high **XMN2** oil temperature.	Drive Electrical	6 9
OIL HOT MAIN XMSN 2 indicator - is lighted when HOD displays normal **XMN1** oil temperature.	Drive Power Plants Electrical DASEC	6 4 9 11
OIL HOT MAIN XMSN 2 indicator - lights.	Drive Electrical	6 9
OIL HOT NOSE GRBX 1 indicator - is lighted when HOD displays high **NGB1** oil temperature.	Drive Electrical	6 9
OIL HOT NOSE GRBX 1 indicator - is lighted when HOD displays normal **NGB1** oil temperature.	Drive Electrical	6 9
OIL HOT MAIN GRBX 2 indicator - lights.	Drive Electrical	6 9
OIL HOT NOSE GRBX 2 indicator - is lighted when HOD displays high **NGB2** oil temperature.	Drive Electrical	6 9
OIL HOT NOSE GRBX 2 indicator - is lighted when HOD displays normal **NGB2** oil temperature.	Drive Electrical	6 9
OIL HOT NOSE GRBX 2 indicator - lights.	Drive Electrical	6 9
OIL LOW PRI HYD caution light - is on.	Primary Hydraulic Electrical	7 9
OIL LOW UTIL HYD caution light - is on.	Primary Hydraulic Electrical	7 9

Symptom	System	Refer to Chapter
OIL PSI ACC PUMP indicator - does not light with electrical power applied and all power plants off.	Drive Electrical	6 9
OIL PSI ACC PUMP indicator - lights.	Drive Electrical APU	6 9 15
OIL PSI ENG 1 indicator - is lighted with engine **OIL PSIX10** indicating more than 22.	Power Plants Engine Instruments Electrical	4 8 9
OIL PSI ENG 2 indicator - is lighted with engine **OIL PSIX10** indicating more than 22.	Power Plants Engine Instruments Electrical	4 8 9
OIL PSI MAIN XMSN 1 indicator - does not light with electrical power applied and all power plants off.	Drive Electrical	6 9
OIL PSI MAIN XMSN 1 indicator - is lighted when HOD displays normal **XMN1** oil pressure.	Drive Electrical	6 9
OIL PSI MAIN XMSN 2 indicator - does not light with electrical power applied and all power plants off.	Drive Electrical	6 9
OIL PSI MAIN XMSN 2 indicator - is lighted HOD displays normal **XMN2** oil pressure.	Drive Electrical	6 9
OIL PSI NOSE GRBX 1 indicator - does not light with electrical power applied and all power plants off.	Drive Electrical	6 9
OIL PSI NOSE GRBX 1 - is lighted when HOD displays normal **NGB1** oil pressure.	Drive Electrical	6 9
OIL PSI NOSE GRBX 2 indicator - does not light with electrical power applied and all power plants off.	Drive Electrical	6 9

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
OIL PSI NOSE GRBX 2 indicator - is lighted when HOD displays normal **NGB2** reading.	Drive Electrical	6 9
OIL PSI UTIL HYD caution light - is not on with no utility hydraulic system pressure indicated.	Utility Hydraulic Electrical	7 9
Phazor meter test indicators - do not light with **TEST** button depressed.	Rotors Electrical	5 9
Pilot **ACCELEROMETER** indicator edge-lighting - does not light.	Flight Instruments Electrical	8 9
Pilot **AIRSPEED** indicator edge-lighting - does not light.	Flight Instruments Electrical	8 9
Pilot and CPG caution/warning panel - **ASE** indicator is lighted.	Flight Controls Electrical	11 9
Pilot and CPG **ENG 1 FIRE PULL** switch handles - do not light with **FIRE TEST** switch in **DET 1** position.	Utility Electrical	12 9
Pilot and CPG **ENG 1 FIRE PULL** switch handles - do not light with **FIRE TEST** switch in **DET 2** position.	Utility Electrical	12 9
Pilot and CPG **ENG 2 FIRE PULL** switch handles - do not light with **FIRE TEST** switch in **DET 1** position.	Utility Electrical	12 9
Pilot and CPG **ENG 2 FIRE PULL** switch handles - do not light with **FIRE TEST** switch in **DET 2** position.	Utility Electrical	12 9
Pilot and CPG master caution/warning panels - **BUCS FAIL** indicator is lighted.	Flight Controls Electrical	11 9
Pilot **ANTI ICE** panel edge-light - does not brighten.	Utility Electrical	12 9
Pilot barometric altimeter - internal vibrator is not heard.	Flight Instruments Electrical	8 9
Pilot barometric altimeter edge-lighting - does not light.	Flight Instruments Electrical	8 9

Symptom	System	Refer to Chapter
Pilot clock edge-lighting - does not light.	Miscellaneous Instruments Electrical	8 9
Pilot DIM/TEST panel edge-lighting - does not light.	Engine Instruments Electrical	8 9
Pilot **ENG INST** circuit breaker - does not stay closed.	Engine Instruments Electrical	8 9
Pilot **ENG OIL PRESSURE** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
Pilot **ENG-RTR** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
Pilot **ENGINE CHOP** indicator - does not light with pilot collective stick in **CHOP**.	Power Plants Electrical	4 9
Pilot fire extinguisher panel edge-light - does not brighten.	Utility Electrical	12 9
Pilot **FUEL** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
Pilot **FUEL** indicator vertical display scales and digital readouts - do not indicate existing fuel plus/minus **20** pounds.	Engine Instruments Fuel	8 10
Pilot **FUEL LBX10** indicator **AFT** vertical display - does not indicate between **19** and **21**.	Fuel Electrical	10 9
Pilot **FUEL LBX10** indicator **AFT** vertical display - does not indicate increase with **TRANS** switch set to **AFT**.	Fuel Engine Instruments	10 8
Pilot **FUEL LBX10** indicator **FWD** vertical display - does not indicate between **29** and **31**.	Fuel Engine Instruments	10 8
Pilot **FUEL LBX10** indicator **FWD** vertical display - does not indicate decrease with **TRANS** switch set to **AFT**.	Fuel Engine Instruments	10 8

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
Pilot **FUEL LBX10** indicator **FWD** vertical display - does not indicate increase with **ORIDE** switch at **CPG** and **TRANS** switch at **FWD**.	Fuel Electrical	10 9
Pilot **FUEL** panel edge-lights - do not light.	Fuel Electrical	10 9
Pilot **HIGH RPM ROTOR** indicator - does not light at 104 percent **N_R**.	Drive Electrical	6 9
Pilot **LOW RPM ROTOR** indicator - does not light.	Drive Electrical	6 9
Pilot **LOW RPM ROTOR** indicator - does not light with electrical power applied and all power plants off.	Drive Electrical	6 9
Pilot **N_G** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
Pilot **RESET** button - does not reset stabilator audio warning.	Electrical Stabilator	9 11
Pilot **ST JTSN** switch - no emergency jettison control voltage.	Mission Equipment Electrical	16 9
Pilot **ST JTSN** switch - no primary jettison control voltage.	Mission Equipment Electrical	16 9
Pilot **STANDBY ATTITUDE** indicator edge-lighting - does not light.	Flight Instruments Electrical	8 9
Pilot **STANDBY ATTITUDE** indicator **OFF** flag - is visible with electrical power on and indicator uncaged.	Flight Instruments Electrical	8 9
Pilot **STORES JETT** panel edge-light - does not light.	Mission Equipment Electrical	16 9
Pilot **STORES JETT** panel - no jettison voltage to pylon.	Mission Equipment Electrical	16 9
Pilot **TGT** indicator - does not show digital readouts.	Engine Instruments Electrical	8 9

Symptom	System	Refer to Chapter
Pilot **TGT** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
Pilot **TORQUE** indicator edge-lighting - does not light.	Engine Instruments Electrical	8 9
Pilot **VERTICAL SPEED** indicator edge-lighting - does not light.	Flight Instruments Electrical	8 9
Pilot windshield wiper - does not operate at low speed.	Utility Electrical	12 9
PITOT HTR circuit breaker (CB36) - does not stay closed or 28 VDC to pilot anti ice panel is not present at A76J1-s.	Electrical Anti-Ice	9 12
PILOT HTR circuit breaker - does not stay closed.	Utility Electrical	12 9
PNVS shroud window heater - does not heat.	Utility Electrical MRTU Type I	12 9
POWER ENG 1 circuit breaker (CB62) - does not stay closed or 115 VAC to engine 1 power transformer is not present at P76P1-22.	Electrical Power Plants	9 4
POWER ENG 2 circuit breaker (CB44) - does not stay closed or 115 VAC to engine 2 power transformer is not present at P1-23.	Electrical Power Plants	9 4
PRI DISCH and **RES DISCH** indicators - do not light.	Utility Electrical	12 9
PRI HYD caution light is on.	Primary Hydraulic Electrical	7 9
PRI HYD gage does not indicate 3000 psi (APU operating).	Primary Hydraulic Drive APU	7 6 15

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
PRI HYD gage does not indicate 3000 psi (GPU operation).	Primary Hydraulic Electrical	7 9
PRI HYD PSI caution light is on.	Primary Hydraulic Electrical	7 9
PRI HYD PSI caution light - is not on with no primary hydraulic system pressure indicated.	Primary Hydraulic Electrical	7 9
PRI HYD PSI, **UTIL HYD PSI**, and **SHAFT DRIVEN COMP** indicators - are lighted with **95%/NORM** switch set to **NORM** and APU operating.	APU Electrical	15 9
PRI HYD PSI, **UTIL HYD PSI**, and **SHAFT DRIVEN COMP** indicators - are not lighted with **95%/NORM** switch set at **95%** and APU operating.	APU Electrical	15 9
Primary fire bottle APU cartridge actuation voltage - is not present with **APU FIRE BTL** switch in **PRI** position.	Utility Electrical	12 9
Primary fire bottle engine 1 cartridge actuation voltage - is not present with pilot **FIRE BTL** switch in **PRI** position.	Utility Electrical	12 9
Primary fire bottle engine 1 cartridge actuation voltage - is not present with CPG **FIRE BTL** switch in **PRI** position.	Utility Electrical	12 9
REFUEL VALVE open indicator on pilot caution/warning panel - is not lighted with **REFUEL VALVE** switch at **OPEN**.	Fuel Electrical	10 9
REFUEL VALVE OPEN indicator on refueling panel - is not lighted with **REFUEL VALVE** switch at **OPEN**.	Fuel Electrical	10 9

Symptom	System	Refer to Chapter
Right FAB standby fan - does not operate.	Environmental Control Electrical	13 9
Right wing pitot tube heater - does not heat.	Utility Electrical	12 9
RTR BK caution light is off.	Utility Hydraulic Electrical	7 9
RTR BK caution light stays on with rotor brake released.	Utility Hydraulic Electrical	7 9
RTR BLADE PWR CONTROLLER NO-GO RH XMSN BAY - or **RTR BLADE DISTR DE-ICE NO-GO MAIN RTR MAST** - appears on HOD.	Utility Electrical	12 9
RTR BRK circuit breaker (CB37) - does not stay closed or 28 VDC to rotor brake pressure switch is not present at A76J1-n.	Electrical Rotor Brake	9 7
RTR BRK circuit breaker - does not stay closed.	Hydraulic Electrical	7 9
SHAFT DRIVEN COMP indicator - is not lighted during APU start cycle.	Pressurized Air Electrical	7 9
SHAFT DRIVEN COMP indicator - remains lighted after APU start cycle.	Pressurized Air Fuel	7 10
STAB AUTO AC circuit breaker (CB2) - does not stay closed or 115 VAC to stabilator control unit is not present at P76P1-36.	Electrical Stabilator	9 11
STAB AUTO AC circuit breaker - does not stay closed.	Flight Controls Electrical	11 9
STAB AUTO DC circuit breaker (CB3) - does not stay closed or 28 VDC to stabilator control unit is not present at P2-f.	Electrical Stabilator	9 11

HELICOPTER SYSTEMS - COMMON FAILURE SYMPTOM LIST (cont)

Symptom	System	Refer to Chapter
STAB AUTO DC circuit breaker - does not stay closed.	Flight Controls Electrical	11 9
STAB CONTROL UNIT 1 NO-GO LH CATWALK - appears on HOD (effective aircraft Serial No. 82-23355 thru 83-23814).	Flight Controls Electrical	11 9
STAB CONTROL UNIT 2 NO-GO LH AFT CATWALK - appears on HOD.	Flight Controls Electrical	11 9
STAB MAN AC circuit breaker (CB7) - does not stay closed or 115 VAC to stabilator position indicator is not present at P76P1-37.	Electrical Stabilator	9 11
STAB MAN AC circuit breaker - does not stay closed.	Flight Controls Electrical	11 9
STAB MAN DC circuit breaker (CB6) - does not stay closed or 28 VDC to stabilator relay panel is not present at A76P2-g.	Electrical Stabilator	9 11
STAB MAN DC circuit breaker - does not stay closed.	Flight Controls Electrical	11 9
Stabilator - does not move to full up position.	Flight Controls Electrical	11 9
Stabilator - does not move up or down.	Flight Controls Electrical	11 9
Stabilator audio warning - is not heard in either pilot or CPG headset.	Electrical Stabilator	9 11
Pilot **STAB POS** indicator does not indicate **25±2** degrees when reset pushbutton is pressed.	Flight Controls Electrical	11 9
STROBEX - does not light.	Rotors Electrical	5 9
TADS shroud window heaters - do not heat.	Utility Electrical MRTU Type I	12 9

Symptom	System	Refer to Chapter
TAIL WHEEL advisory light - does not illuminate.	Utility Hydraulic Electrical	7 9
TAIL WHEEL lock panel edge-light - does not come on.	Utility Hydraulic Electrical	7 9
TEMP INT indicator - lights.	Drive Electrical	6 9
THROT circuit breaker (CB8) - does not stay closed or 28 VDC to CPG power quadrant panel is not present at A76J1-d.	Electrical Power Plants	9 4
TRIM circuit breaker (CB87) - does not stay closed or 28 VDC to pilot and CPG cyclic sticks is not present at A76J1-Y, -Z.	Electrical Flight Control	9 11
TRIM circuit breaker does not stay closed - **FORCE TRIM ON.**	Flight Controls Electrical	11 9
TWHL LOCK circuit breaker (CB59) - does not stay closed.	Utility Hydraulic Electrical	7 9
TWHL LOCK circuit breaker (CB59) - does not stay closed or 28 VDC to **TAIL WHEEL** lock panel is not present at P1-15.	Electrical Utility Hydraulic	9 7
UTIL ACC PSI X1000 indicator edge-light does not come on.	Utility Hydraulic Electrical	7 9
UTIL HYD caution light is on.	Utility Hydraulic Electrical	7 9
UTIL HYD gage does not indicate **3000** psi (APU operating).	Utility Hydraulic Drive APU	7 9 11
UTIL HYD gage does not indicate **3000** psi (GPU operating)	Utility Hydraulic Electrical	7 9

HELICOPTER SYSTEMS - COMMON FAILURE SYSTEM LIST (cont)

Symptom	System	Refer to Chapter
UTIL PSI HYD caution light is on.	Utility Hydraulic Electrical	7 9
VIB GRBX indicator - lights.	Drive Electrical	6 9
VIB MON circuit breaker (CB79) - does not stay closed.	Drive Electrical	6 9
VIB MON circuit breaker (CB79) - does not stay closed or 28 VDC to rotor balance signal processor is not present at P1-10.	Electrical Drive	9 6

CHAPTER 1. HELICOPTER GENERAL TROUBLESHOOTING

CHAPTER OVERVIEW

Chapter 1 contains general troubleshooting information for the AH-64A helicopter.

It tells how to use this volume and the troubleshooting information.

All maintenance information for the AH-64A helicopter is contained in TM 55-1520-238-23, or in the manuals referenced therein.

Chapter 1 is divided into the following sections:

Section	Para	Title
I	1-1-1	Troubleshooting Information - General
II	1-2-1	Troubleshooting - Methods and Checks
III	1-3-1	Troubleshooting - General Procedures
IV	1-4-1	Fault Detection/Location System (FD/LS) - General
	1-4-2	Use of FD/LS for Troubleshooting
	1-4-3	FD/LS Operation - Starting
	1-4-4	Use of DEK for FD/LS Operation - General
	1-4-5	FD/LS - End-To-End (ETE) Check
	1-4-6	FD/LS Operation - Stopping
	1-4-7	FD/LS Displays - Complete Listing
V	1-5-1	LRU Troubleshooting - Off Helicopter

HOW TO USE THIS VOLUME

A Overview.

- This is the first volume (Volume 1) of a three-volume troubleshooting manual (TM 55-1520-238-T) for the AH-64A helicopter.

- TM 55-1520-238-T contains troubleshooting instructions for the AH-64A helicopter and consists of the following three volumes:

Volume	Contains
Volume 1	Chapters 1 through 8
Volume 2	Chapter 9
Volume 3	Chapters 10 through 16

- These three volumes are used with multiple volume TM 55-1520-238-23 which contains maintenance information for the AH-64A helicopter.

- Before using these troubleshooting volumes, learn how to use the complete manual. (Refer to **HOW TO USE THIS MANUAL** in TM 55-1520-238-23.)

- Learn how to use these troubleshooting volumes. Read and understand all paragraphs in Section I of this volume.

- Check how this first volume is put together.

B Failure Symptom Lists.

- MASTER COMMON FAILURE SYMPTOM LIST is in front of the MISSION EQUIPMENT Chapter 16 in Volume 3 of this manual. It includes all failure symptoms common to two or more systems (or equipments), for which troubleshooting coverage is in separate technical manuals.

  These symptoms result from a trouble in either one of the systems where troubleshooting procedures for each system are in different technical manuals.

  An example is a symptom caused by a problem in either a system of the helicopter, or in mission equipment that is not part of the helicopter.

- HELICOPTER SYSTEMS COMMON FAILURE SYMPTOM LIST is at the front of this volume, prior to Chapter 1. It includes all failure symptoms in this manual that are common to more than one system of the helicopter.

- A SYSTEM FAILURE SYMPTOM LIST is at the front of each chapter in this manual. It lists all failure symptoms for the system contained in the chapter.

C Chapter and Sections.

- Chapter 1 contains general troubleshooting information.
- Chapter 2 and following chapters provide troubleshooting information for each system.
- Chapters contain sections and paragraphs with troubleshooting procedures.
- Chapter and section numbers with equipment covered are shown on the first page of each chapter.

D Paragraphs. Each paragraph in Chapter 2 and following contains the troubleshooting procedures needed for a specific job.

E Initial Setup. An initial setup appears at the beginning of each troubleshooting procedure.

- The initial setup lists items and information needed.
- For information on and use of the initial setup, refer to TM 55-1520-238-23.

F Using This Volume.

- When a trouble exists, but it is not known if the system is in the helicopter or mission equipment, refer to the MASTER COMMON FAILURE SYMPTOM LIST (Chapter 16).
- When a trouble exists and it is known that the system is in the helicopter, but the system is not known, refer to HELICOPTER SYSTEMS COMMON FAILURE SYMPTOM LIST.
- When a trouble exists in a helicopter system, and the system is known, refer to the chapter for that system.

  For a known trouble symptom, check the FAILURE SYMPTOM LIST at the front of the chapter.

  If no symptom is known, use the first page of the chapter, and select first paragraph listed for equipment that has trouble.
- In sections covering equipment that is checked by automatic built-in test equipment, the first paragraph is a **FAULT DETECTION/LOCATION SYSTEM (FD/LS)** check.
- In sections covering equipment not checked by automatic built-in test equipment, the first paragraph is a **MAINTENANCE OPERATIONAL CHECK (MOC)**.

1-1-1. TROUBLESHOOTING INFORMATION - GENERAL

A Manual Format. Before troubleshooting, learn **HOW TO USE THIS VOLUME.**

B References. When troubleshooting, you may need these manuals for reference:

Manual (TM)	Title	Coverage
3-4240-312-12&P	MASK, CHEMICAL - BIOLOGICAL: AIRCRAFT, M43	CBR blower, mask and mounting bracket
9-1090-208-23-2	AVIATION UNIT AND INTERMEDIATE TROUBLESHOOTING MANUAL: ARMAMENT SUBSYSTEM, HELICOPTER: M139; GUN, AUTOMATIC, 30 MILLIMETER; M230; ROCKET MANAGEMENT SUBSYSTEM, INVENTORY - DEPLOYMENT: M140	Armament Control System Chaff Dispenser System Area Weapon System
9-1230-476-20-2	AVIATION UNIT TROUBLESHOOTING MANUAL: FIRE CONTROL SYSTEM	Fire Control Computer Multiplex Subsystem Air Data Subsystem
9-1270-221-23	AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL: FIRE CONTROL SUBSYSTEM, HELMET DIRECTED: M142	Integrated Helmet and Display Sight System (IHADSS)
9-1270-476-20-1	AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL: TARGET ACQUISITION DESIGNATOR SIGHT (TADS) AN/ASQ-170	Target Acquisition Designator Sight (TADS)
9-1427-475-20	AVIATION UNIT MAINTENANCE MANUAL: HELLFIRE MISSILE EQUIPMENT AND HELLFIRE MISSILE LAUNCHER INTERFACE	Hellfire Missile Equipment
11-1520-238-23-2	AVIATION UNIT AND INTERMEDIATE TROUBLESHOOTING MANUAL: AVIONICS CONFIGURATION	Communications System Navigation System Headset Attitude Reference Set Identification (IFF) System Penetration Aids and Countermeasurers Video Equipment
11-5855-265-23	AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL: PILOT NIGHT VISION SENSOR AN/AAP-11	Pilot Night Vision Sensor (PNVS)
11-5895-1184-23	AVIATION AND INTERMEDIATE MAINTENANCE MANUAL: SYMBOL GENERATOR MX-10465/ASQ	Symbol Generator

Manual (TM)	Title	Coverage
11-6605-300-23	AVIATION UNIT AND MAINTENANCE MANUAL: ATTITUDE HEADING REFERENCE SYSTEM AN/ASN-143	Attitude Heading and Reference System (AHRS)
11-6625-3085-12	OPERATOR AND AVIATION UNIT MAINTENANCE: ELECTRONIC TEST EQUIPMENT FACILITY QQ-290(V)2/MSM	Automatic testing of LRUs off helicopter
55-1500-323-24	ORGANIZATIONAL DEPOT MAINTENANCE MANUAL OF AERONAUTICAL ELECTRICAL AND ELECTRONIC INSTALLATION PROCEDURES	General wiring maintenance information
55-1520-238-10	*AH-64A HELICOPTER OPERATOR'S MANUAL	Helicopter and mission equipment
55-1520-238-23	*AH-64A HELICOPTER MAINTENANCE	Helicopter systems by separate volumes
	AH-64A HELICOPTER WIRING DATA APPENDIX F	Wire lists, wiring harness, repair and connector information
55-1520-238-CL	OPERATOR'S CHECKLIST	AH-64A Helicopter
55-1520-238-MTF	MAINTENANCE TEST FLIGHT MANUAL: AH-64A HELICOPTER	Maintenance Test Flight Procedures
55-1520-238-L	AH-64A HELICOPTER LIST OF APPLICABLE PUBLICATIONS	List of applicable publications
55-2840-248-23	AVIATION UNIT AND INTERMEDIATE MAINTENANCE INSTRUCTIONS: ENGINE, AIRCRAFT, TURBOSHAFT MODELS T700-GE-700, T700-GE-701	Instructions regarding servicing, testing, troubleshooting, preventive and general maintenance
55-4920-402-13&P	OPERATING INSTRUCTIONS AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) VIBREX BALANCING KIT	Vibrex Balancing Kit
FM-10-68	AIRCRAFT REFUELING	Aircraft refueling defueling procedures

*For listing of all TMs applicable to the AH-64A helicopter, refer to Appendix A of TM 55-1520-238-23.

1-1-1. TROUBLESHOOTING INFORMATION - GENERAL (cont)

NOTE

Unless text or illustrations specify otherwise , all following information applies.

C Electrical Units. Unless otherwise specified, the values indicated for electrical units in this volume are as follows:

- Resistance (R) in ohms (Ω)
- Capacitance (C) in micromicrofarads (uuf)
- Inductance (L) in henrys (H)
- Voltage (E) in volts (V)
- Current (I) in amperes (A)
- Frequency in Hertz (Hz)
- Power in watts (W)

D Electrical Measurement Tolerances. Unless otherwise specified, tolerances for resistance, capacitance, inductance, voltage and current are ±10 percent.

E Grounds. Except as otherwise indicated (such as chassis ground), all grounds shown are common ac, dc and signal grounds.

F DC Voltage Polarities. All indicated dc voltages are positive polarity (+28 VDC, etc.).

G AC Voltages. All indicated ac voltages are 400 Hz.

NOTE

Prior to performing system troubleshooting related to circuit breakers, mechanical operation of the circuit breakers is to be verified, with helicopter power not applied and the battery disconnected. Any circuit breaker that does not stay closed is to be replaced (TM 55-1520-238-23).

H Circuit Breakers. Circuit breakers are to be at closed (ON) position. (Troubleshooting procedures for all circuit breakers and all electrical circuits supplying electrical power to circuit breakers are in the Electrical System chapter in Volume 2 of this manual.)

I Signal Names, States, Conditions, and Values. Signal values shown exist for the conditions and states indicated by signal names.

J Coaxial Cable Resistance Measurements. When ends of a coaxial cable are disconnected, resistance measurements from the shield to the center conductor should indicate open.

K Electrically Operated Devices. On interconnection diagrams, relays, solenoids, and other electrically activated devices are shown in the deenergized (normally open) state.

L Wiring Information.

1. Interconnection diagrams in this volume are used for wiring checks. Reference designators for LRUs are shown in the lower right corner of the LRU on the diagrams. Electrical wiring repairs peculiar to the AH-64A are in TM 55-1520-238-23. Electrical wiring not peculiar to the AH-64A are in TM 55-1500-323-25.

2. Appendix F of TM 55-1520-238-23 is used to obtain the following additional information:

   - End view of all connectors.

   - All other wire data for all wire harnesses (wire numbers, exact connector, terminal board, and ground stud locations, etc., in helicoper).

M Wiring Checks. Where REPAIR OR REPLACE WIRING OR CONNECTIONS is specified:

1. A check is to be made for short or open (as specified) for each wire segment, terminal board, connector pin and connection over the entire length of wiring between pins or terminals indicated.

2. The electrical interconnection diagram for the equipment being checked is used in making the wiring check.

3. Instructions to repair wire(s) includes repair or replacement of wires, connections at end connector pins, terminals, etc. (all required end-to-end repair and replacement between wiring points specified).

4. The component location and configuration illustration (for the equipment being checked) is used to locate wiring connectors and components in the helicopter.

5. Troubleshooting helicopter wiring is normally accomplished by 68F10 Aircraft Electrician, although not listed in all setup tables (to prevent repetition).

1-1-1. TROUBLESHOOTING INFORMATION - GENERAL (cont)

N Terminal Board Connections. Electrical connections at terminal boards are typically shown as follows:

1. Vertical and horizontal lines indicate electrical separation between terminals and blocks of terminals.

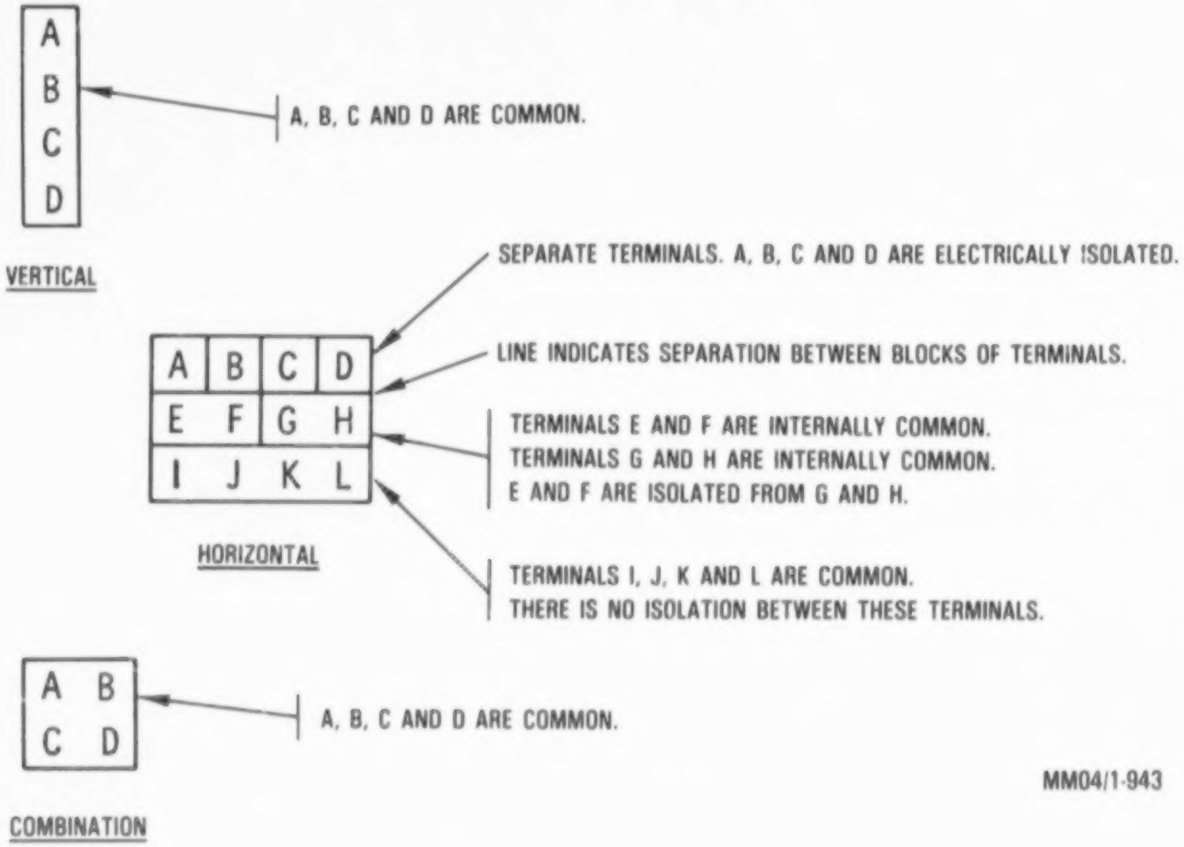
2. Absence of lines indicates no separation.

3. Terminal board connections may be illustrated horizontally, vertically or a combination of both.

O Exact displays and markings on controls and indicators are shown in **BOLDFACE** type in text.

P Lamp Indicators. When using lamp indicators for troubleshooting, lamp indicators must be known to be good.

Q Forward and Aft Views. Forward and aft views refer to forward and aft in the helicopter. Where required for clarity, **FWD** and **AFT** arrows are used.



VERTICAL

A, B, C AND D ARE COMMON.

HORIZONTAL

SEPARATE TERMINALS. A, B, C AND D ARE ELECTRICALLY ISOLATED.

LINE INDICATES SEPARATION BETWEEN BLOCKS OF TERMINALS.

TERMINALS E AND F ARE INTERNALLY COMMON.
TERMINALS G AND H ARE INTERNALLY COMMON.
E AND F ARE ISOLATED FROM G AND H.

TERMINALS I, J, K AND L ARE COMMON.
THERE IS NO ISOLATION BETWEEN THESE TERMINALS.

COMBINATION

A, B, C AND D ARE COMMON.

MM04/1-943

1-2-1. TROUBLESHOOTING - METHODS AND CHECKS

The troubleshooting procedures are based on one fault at a time. Multiple faults and intermittent problems are not covered in this manual. The following methods and checks apply to all chapters of this volume:

A Troubleshooting the AH-64A Helicopter. Troubleshooting consists of:

- Performing a Fault Detection/Location System (FD/LS) check, when applicable. (This check uses built-in, automatic test equipment.)

- Using failure symptom(s) to find any maintenance operational check needed.

- Observing indications on equipment and instruments during an operational check. This is usually a manual check. (Operational checks supplement applicable FD/LS checks and completely check equipment not checked by FD/LS.)

- Manually locating and isolating troubles using fault isolation procedures.

B Failure Symptom List. This list has the failure symptoms that may occur during the operational check.

1. A symptom usually occurs if the equipment has a fault.

2. The failure symptom list is used when a failure symptom occurs.

3. The list shows which equipment needs to be checked for specific failure symptoms. The list shows which operational check applies.

C Fault Detection/Location System (FD/LS) Check. This checks the equipment.

1. Data is entered into the data entry keyboard (para 1-4-1).

2. Messages appear on the CPG heads out display and/or pilot VDU display (para 1-4-1).

3. A **GO** message appears when the equipment has no faults.

4. A **NO GO** appears when the equipment is faulty.

   - IF THE FD/LS SHOWS A **NO GO**, REPLACE THE LINE REPLACEABLE UNIT (LRU) INDICATED IN THE **NO GO**.

   - IF, AFTER REPLACEMENT OF THE LRU INDICATED IN THE **NO GO**, the FD/LS STILL SHOWS A **NO GO**, PERFORM THE APPLICABLE OPERATIONAL CHECK.

NOTE

The repeated **NO-GO** indication may be caused by faulty interconnecting wiring rather than by the LRU itself.

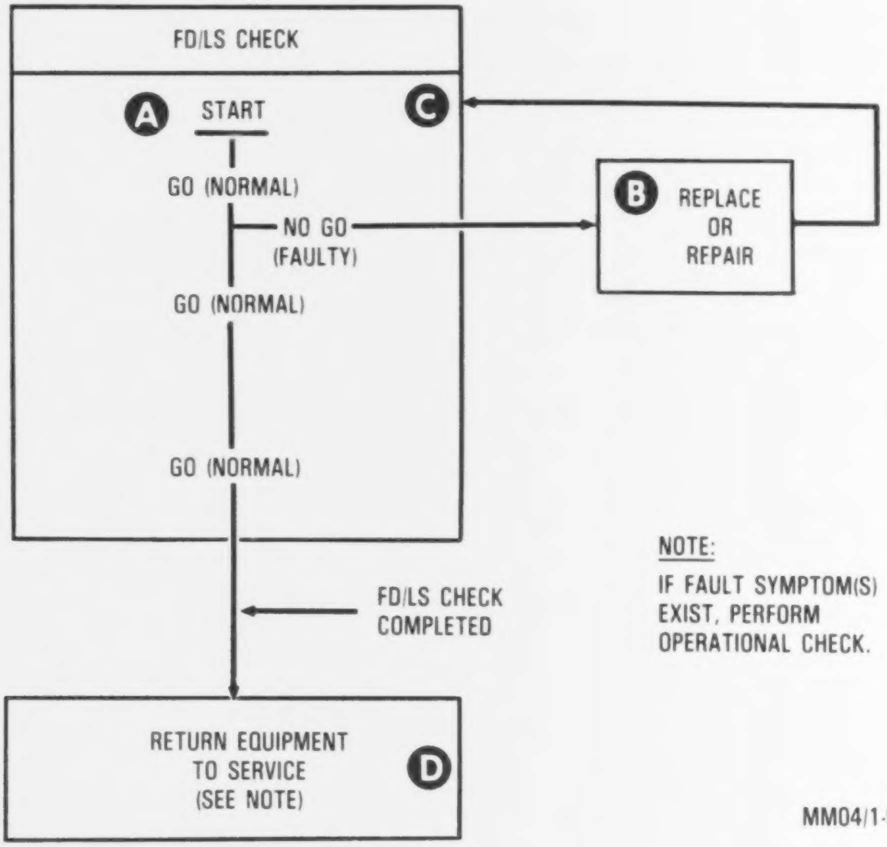
   - IF THE FD/LS SHOWS A **GO** AND A FAULT EXISTS, YOU MUST PERFORM THE OPERATIONAL CHECK.

5. Some messages require operator action.

NOTE

Operator action is to be taken within 30 seconds of receiving the message.

Complete instructions for performing all FD/LS checks for the helicopter are in this volume. For further information on the FD/LS, refer to paragraph 1-4-1.


FD/LS CHECK
A
START
C
GO (NORMAL)
NO GO
(FAULTY)
B
REPLACE
OR
REPAIR
GO (NORMAL)
GO (NORMAL)
FD/LS CHECK
COMPLETED
RETURN EQUIPMENT
TO SERVICE
(SEE NOTE)
D

NOTE:

IF FAULT SYMPTOM(S) EXIST, PERFORM OPERATIONAL CHECK.

MM04/1-942-1

1-2-1. TROUBLESHOOTING - METHODS AND CHECKS (cont)

D Maintenance Operational Check (MOC). This checks normal operation of the equipment.

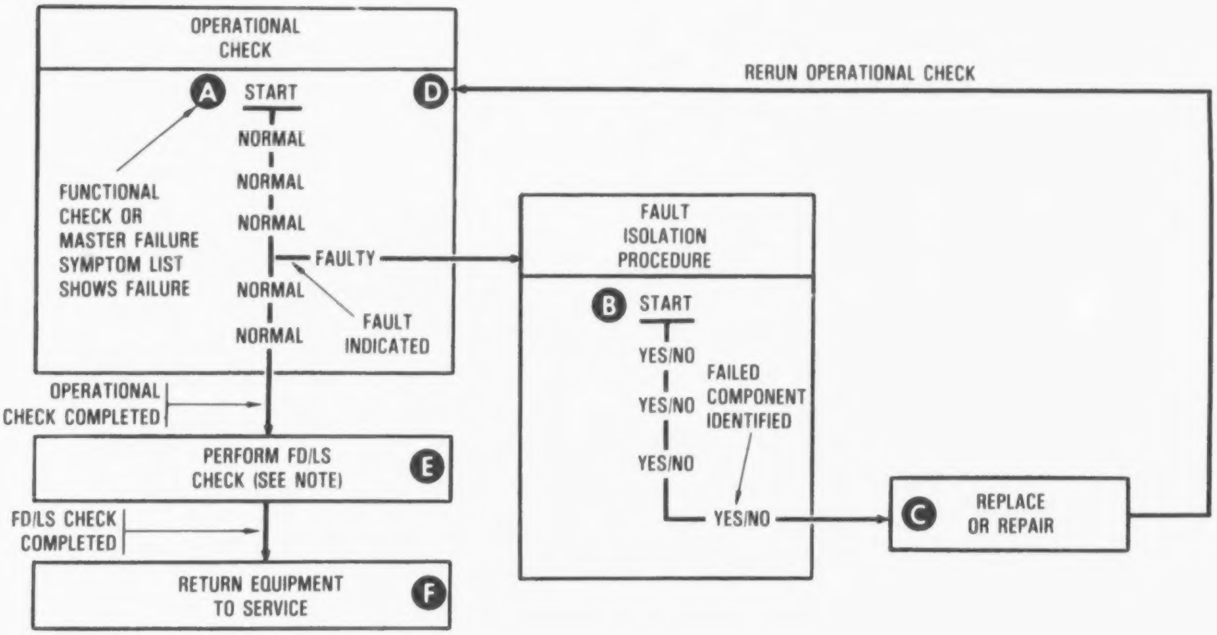
NOTE

All maintenance operational checks are called operational checks in paragraph headings.

1. Indications (results) that occur for normal operation are checked in logical sequence.
2. Where the result is not correct, a fault isolation procedure is provided for each wrong result.
3. Wrong results are the failure symptoms, which reference the fault isolation procedures.

NOTE

Failure symptoms are listed in the FAILURE SYMPTOM LIST.


OPERATIONAL CHECK
A
START
D
RERUN OPERATIONAL CHECK
NORMAL
NORMAL
NORMAL
FUNCTIONAL CHECK OR MASTER FAILURE SYMPTOM LIST SHOWS FAILURE
FAULTY
NORMAL
NORMAL
FAULT INDICATED
FAULT ISOLATION PROCEDURE
B
START
YES/NO
YES/NO
YES/NO
YES/NO
FAILED COMPONENT IDENTIFIED
C
REPLACE OR REPAIR
OPERATIONAL CHECK COMPLETED
PERFORM FD/LS CHECK (SEE NOTE)
E
FD/LS CHECK COMPLETED
RETURN EQUIPMENT TO SERVICE
F

NOTE: IF FD/LS CHECK EXISTS. (OTHERWISE RETURN EQUIPMENT TO SERVICE.)

MM04/1-942-2

E Road Map Approach. When doing operational checks and fault isolation procedures, use the troubleshooting data like a road map.

1. You must start at the beginning and follow to the end.

   - ALWAYS START WITH THE OPERATIONAL CHECK.
   - DO NOT SKIP OR MISS A STEP.
   - IN FLOW DIAGRAMS, ALWAYS START WITH THE UPPER LEFT BLOCK.
   - AFTER REPAIR, ALWAYS PERFORM THE OPERATIONAL CHECK AND THEN THE FD/LS CHECK (when there is an FD/LS check).

2. As shown in the troubleshooting flow diagram, if operational check result is normal, proceed to the next step. If result is wrong, perform the fault isolation procedure indicated.

3. Each step of the fault isolation procedure contains a YES/NO question. The answer determines the route to be followed through the rest of the procedure.

F Fault Isolation Procedure. This procedure is used to manually find and correct the fault.

1. Step-by-step checks are done from a block flow diagram.

2. The checks are made in the logical order shown.

   - TO FIND AND CORRECT FAULTS, START AT THE BEGINNING AND DO ALL STEPS IN ORDER.
   - TO LOCATE ELECTRICAL COMPONENTS AND CONNECTORS, USE THE ELECTRICAL COMPONENT AND LOCATION ILLUSTRATION FOR THAT OPERATIONAL CHECK.
   - CONNECTORS WHICH ARE SPECIFICALLY CALLED OUT AS BEING DISCONNECTED IN A FAULT BLOCK (EXAMPLE; DISCONNECT P101) WILL REMAIN DISCONNECTED UNTIL THE END OF TASK, UNLESS STATED TO BE RECONNECTED IN A LATER BLOCK (EXAMPLE; CONNECT P101).
   - TO TROUBLESHOOT WIRING AND CIRCUITS, USE THE ELECTRICAL INTERCONNECTION DIAGRAM FOR THAT OPERATIONAL CHECK.

3. The checks direct you to the most probable failures.

4. As the procedure is performed, the trouble is found.

5. The checks tell how to correct the trouble.

6. After repair or replacement, **YOU MUST REPEAT THE OPERATIONAL CHECK.**

1-3-1. TROUBLESHOOTING - GENERAL PROCEDURES

A Starting Troubleshooting.

- Determine the equipment to troubleshoot.

NOTE

If faulty equipment is not known and a failure symptom exists, use failure symptom list to determine equipment.

- Select the chapter, section and paragraph to use. (Refer to information on using this volume in **HOW TO USE THIS VOLUME.**)
- For use of external power and the ground service utility receptacles, refer to TM 55-1520-238-23. If external power is not available, use on-board power (APU). Refer to TM 55-1520-238-23 for application of electrical and hydraulic power, and pressurized air. External power is preferred; however, on-board power (APU) may be used.
- During power up procedures, if circuit breakers do not stay closed, do the operational check for that equipment to identify and correct the fault.
- During power up procedures, if power is not available to the equipment, refer to chapter 9 of this manual to troubleshoot the electrical system.
- First perform the FD/LS check (if there is one for the equipment).
- If the FD/LS check does not find the trouble, do not perform the FD/LS - STOPPING procedure or the power down procedure. Perform the OPERATIONAL CHECK.
- If there is no FD/LS check, perform the OPERATIONAL CHECK.
- Troubleshoot using the specific procedures in the selected paragraph.

B During Troubleshooting. When troubleshooting, comply with the following:

WARNING

To avoid personal injury, comply with standard safety and operating procedures and practices. Use extreme care when power is on, especially with 115/220 VAC circuits. When practical, make checks of circuits with power off.

To avoid personal injury when connecting or disconnecting ac or high current dc circuits, first turn off power.

CAUTION

When making resistance, open, short or other ohmmeter checks on circuits; always deenergize the circuit to avoid damage to the meter.

1. Correct faults and repair any equipment where damage is obvious.

CAUTION

Assure that ECS fans are operating while electrical power is applied to helicopter to prevent equipment damage.

2. **ALWAYS** maintain required cooling of units while operating equipment.

NOTE

For information on cooling requirements, refer to the Environmental Control System chapter in Volume 3 of this manual.

3. LRU Replacement. If troubleshooting procedures indicate that a LRU is faulty, it is replaced a second time only under one of the following conditions:

   - When a preexisting failure in the interfacing wiring or system caused the newly replaced LRU to fail and the preexisting failure has been corrected.
   - The replacement LRU is known to be defective and the interconnecting wiring is known to be OK.

   The LRU is not to be replaced again under any of the following conditions:

   - If the interconnecting wiring is not absolutely known to be OK.
   - If the newly replaced LRU is not absolutely known to be defective.
   - If, under any circumstances, the LRU has already been replaced a second time.

C Completing Troubleshooting. When completing troubleshooting, **ALWAYS**:

1. Prior to application of power:

   - Reconnect items disconnected during troubleshooting.
   - Reinstall or replace items removed during troubleshooting.

2. To ensure that trouble is corrected:

   - If trouble is found and corrected using an FD/LS check, repeat the FD/LS check.
   - If trouble is found and corrected using an operational check, repeat the operational check - then perform any applicable FD/LS check.

3. Secure all doors, panels, and opened areas.

D General Procedures - Summary.

1. Use only correct methods and checks (para 1-2-1).

2. Comply with instructions in this paragraph.

3. Use the troubleshooting data like a road map.

   - You **MUST** start at the beginning and follow to the end.
   - Do not skip or miss a step.
   - In flow diagrams, **ALWAYS** start with the upper left block.

4. When completing troubleshooting, you **MUST**:

   - Repeat and complete the operational and/or FD/LS check(s) that apply.
   - Secure all doors, panels, and opened areas.

E Troubleshooting LRUs - Off Helicopter.

- Troubleshooting beyond the scope of this manual for LRUs with built in test equipment is done with automatic test equipment. (Refer to para 1-5-1.)

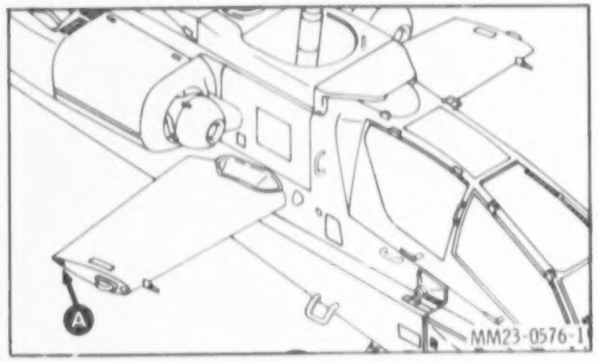
1-3-2. MAINTENANCE HEADSET CONNECTION PROCEDURE

Tools:

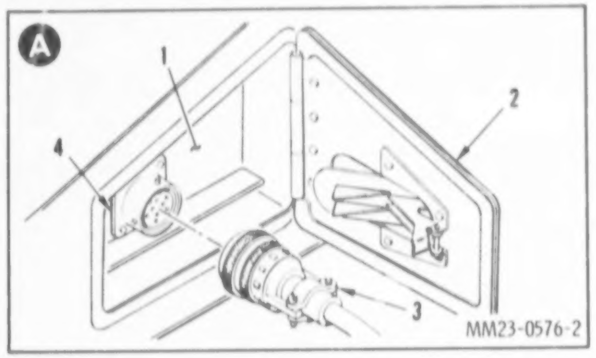
Nomenclature	Part Number (NSN)
Headset, Microphone (2)	5965-00-755-4656
Cord Assembly, Electrical-Maintenance Headset	5995-01-163-9549

A. CONNECT HEADSET TO GROUND SERVICE PANEL

1. **At ICS ground service panel (1) open door (2).**

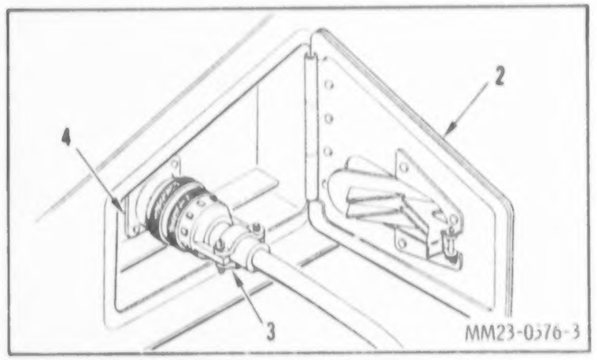

A
MM23-0576-1

2. **Connect ICS cable connector (3), and ground panel receptacle (4).**


A
1
2
4
3
MM23-0576-2

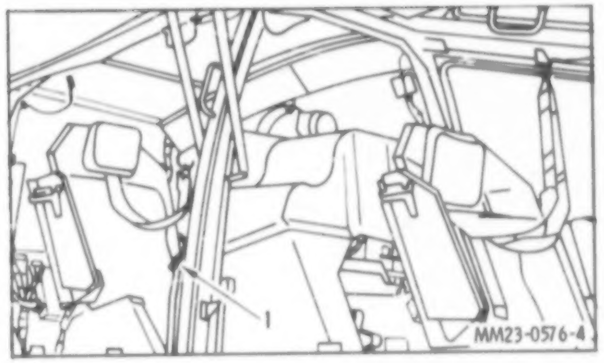
B. DISCONNECT HEADSET FROM GROUND SERVICE PANEL

1. **Disconnect ICS cable connector (3) from ground panel receptacle (4).** Close door (2).

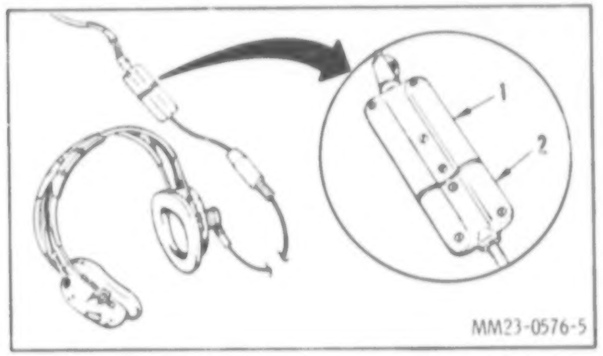

2
4
3
MM23-0576-3

A. CONNECT HEADSET IN FLIGHT STATION

1. **In flight station, locate headset receptacle (1).**

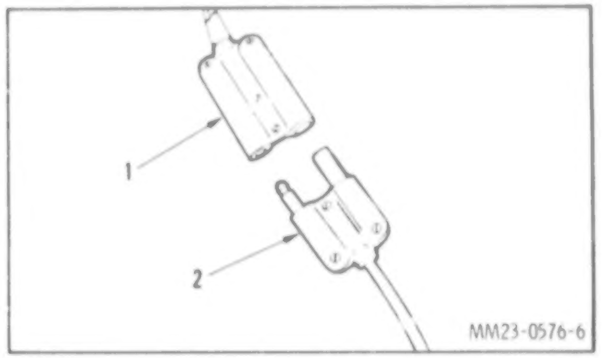

1
MM23-0576-4

2. **Connect headset plug (2) and headset receptacle (1).**


1
2
MM23-0576-5

B. DISCONNECT HEADSET IN FLIGHT STATION

1. **Disconnect headset (2) from headset receptacle (1).**


1
2
MM23-0576-6

END OF TASK

1-4-1. FAULT DETECTION/LOCATION SYSTEM (FD/LS) - GENERAL

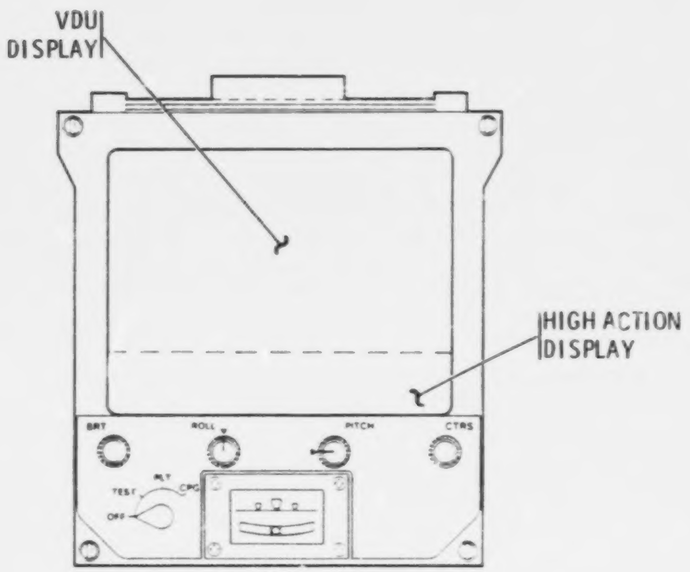
FD/LS is an automatic test system. The system provides an overall test of flight and mission essential systems and line replaceable units (LRUs). The FD/LS uses units, controls and indicators of various helicopter and mission equipment systems. FD/LS is not an equipment system, but is a method (system) of testing the equipment systems.

A Major Functions.

- Provides caution/advisory displays, warning displays, and audible signals to monitor flight critical and mission essential equipment performance.
- Detects failed systems and isolates LRU failures in the systems.
- Displays operational status (GO/NO-GO) of systems and LRUs.

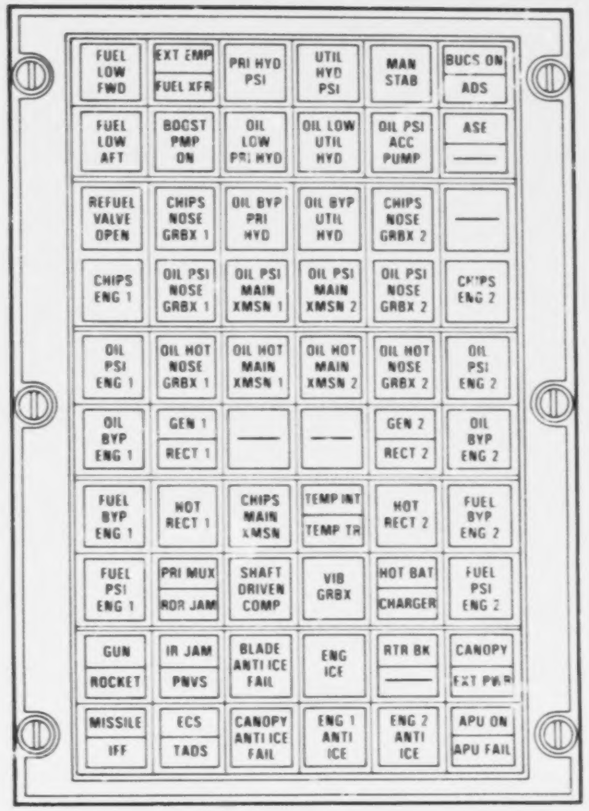
B Controls and Indicators.

The primary control for display of FD/LS data is the data entry keyboard (DEK) at the CPG station. CPG station FD/LS indicators are the CPG optical relay tube (ORT), master caution/warning panel and caution/warning panel. A video display unit (VDU), master caution/warning panel and caution/warning panel are the indicators used at the pilot station. The pilot and CPG helmet display units (HDUs) also provide FD/LS displays.

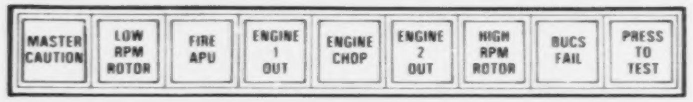

VDU DISPLAY
HIGH ACTION DISPLAY
BRT
ROLL
PITCH
CTRS
TEST
PLT
CPG
OFF

VDU

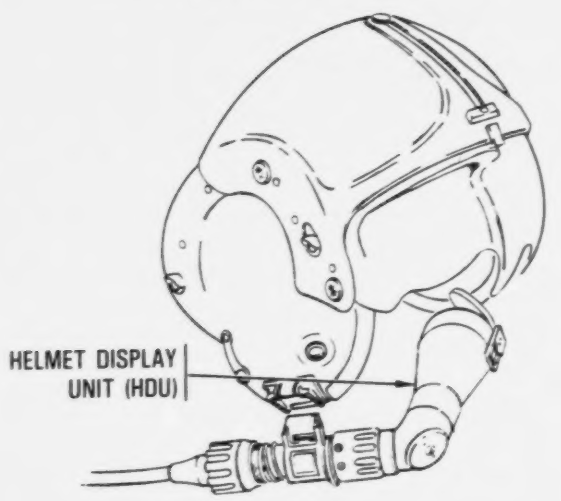
PILOT STATION


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

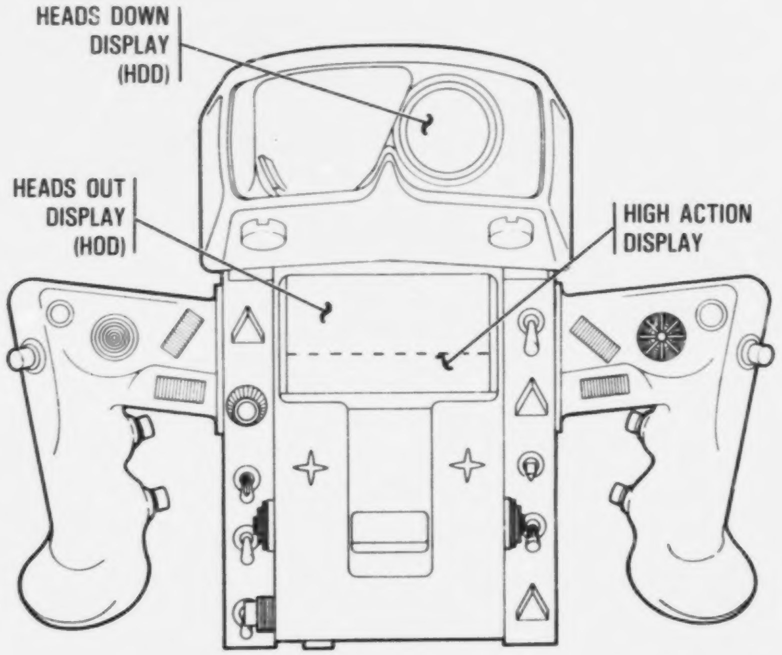
PILOT CAUTION/WARNING PANEL


MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL


HELMET DISPLAY UNIT (HDU)

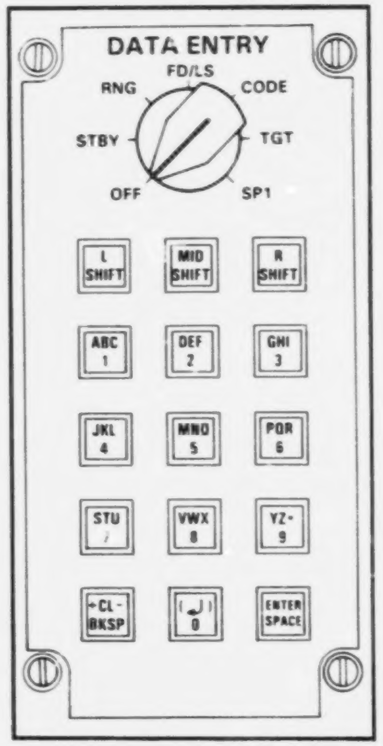
INTEGRATED HELMET UNIT


HEADS DOWN DISPLAY (HDD)
HEADS OUT DISPLAY (HOD)
HIGH ACTION DISPLAY

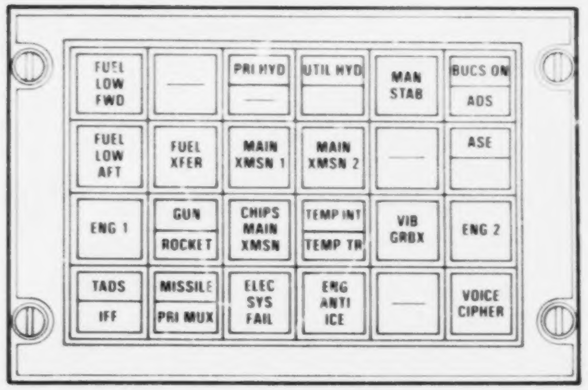
CPG ORT

CPG STATION

PILOT AND CPG STATIONS


DATA ENTRY
FD/LS
RNG
CODE
STBY
TGT
OFF
SP1
L SHIFT
MID SHIFT
R SHIFT
ABC 1
DEF 2
GHI 3
JKL 4
MNO 5
PQR 6
STU /
VWX 8
YZ- 9
←CL- BKSP
↵ 0
ENTER SPACE

DATA ENTRY KEYBOARD (DEK)


FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

CPG CAUTION/WARNING PANEL

MM04/1-944A

best copy available

C Display Indications - General.

Displays indicate test progress, system/LRU status (GO/NO-GO) and location, and any required operator action (prompting).

- Indicators on the caution/warning panels light to show a failure in a specific mission essential system, or provide caution and advisory information.
- System LRU failures are displayed on the CPG ORT heads out display (HOD) and the VDU at the pilot station.
- System level and LRU NO-GOs are displayed on the CPG ORT HOD and heads down display (HDD).
- Displays identical to all CPG ORT displays are available to the pilot, on the VDU, with the pilots **VDU OFF/TEST/PLT/CPG** switch set to **CPG**.
- A display identical to the CPG ORT display is also available to the CPG on the CPG HDU.

NOTE

CPG ORT HOD display is duplicated on the CPG HDU. (CPG HDU may be used as an alternate for FD/LS displays - instead of CPG ORT HDU.)

D FD/LS Operation - General.

- FD/LS operation is automatic when electrical power is applied to the helicopter, in flight and on the ground.
- FD/LS operation continues in a continuous test mode, as long as power is applied.
- FD/LS program allows the operator to select an additional on - command maintenance test mode.
- CPG/operator may select either the continuous or maintenance test mode for display with the **DATA ENTRY** switch on the DEK.

NOTE

FD/LS is operated using a ground power unit (GPU) or the on-board helicopter auxiliary power unit (APU), as required. In the setup tables for FD/LS operation procedures, both power sources are listed.

E Continuous Test Mode.

This mode is used to determine current status of mission essential and flight critical systems. This mode is automatic and does not require operator or keyboard action. During this mode, the FD/LS continuously checks and stores NO-GOs for all failed mission essential systems (a failure message list) in an auto status buffer.

NOTE

FD/LS NO-GO messages may take as long as 10 seconds after an associated system indicator lights on pilot or CPG caution/warning panel.

- A flashing FD/LS is displayed on the CPG ORT, and the associated system indicator lights on the pilot and CPG caution/warning panels. (This occurs for failed mission essential systems.)

Example: CONTINUOUS TEST MODE DISPLAY

FDLS flashes . . . . on HOD sensor identification field (upper left corner)

TADS indicator is lighted . . . . on pilot and CPG caution/warning panels

- Next all mission essential systems NO-GOs are displayed one at a time, sequentially on the ORT HOD, when **DATA ENTRY** switch on DEK is set to **FD/LS**.

NOTE

This shows any failed mission essential or flight critical systems.

Example: CONTINUOUS TEST MODE NO-GO DISPLAY

TADS . . . . displayed on ORT HOD
NO-GO

TADS indicator is lighted . . . . on pilot and CPG caution/warning panels

1-4-1. FAULT DETECTION/LOCATION SYSTEM (FD/LS) - GENERAL (cont)

F Maintenance Test Mode.

This mode is DEK initiated and used for preflight, maintenance and troubleshooting checks. This mode requires an operator to enter data on the DEK at the CPG station. The maintanance test mode checks LRUs for 18 systems. Each system check is separately selected, then automatically executed from the FD/LS maintenance test mode menu. This menu lists all the system checks and the code number for each system check.

Example: FD/LS MAINTENANCE TEST MODE (FD/LS CHECKS) MENU DISPLAY

```
01 - ADS       05 - HARS     09 - PNVS
02 - DASE      06 - IHDS     10 - PYLN          FIRST
03 - DICE      07 - MSL      11 - RKT           PAGE
04 - GUN       08 - MUX      12 - STAB

13 - SYMG      17 - APU
14 - TADS      18 - GEN                        SECOND
15 - UTIL      19 - TRAN                        PAGE
16 - ETE
```

- The FD/LS checks menu is scrolled as necessary (G below) by the operator pressing the DEK **ENTER SPACE** key.
- Operator selects code number for FD/LS system check desired, and enters that number on DEK using keys.
- A complete maintenance FD/LS test of the systems can be executed with a maintenance menu entry of 16, the End to End (ETE) test. The ETE test executes all of the menu tests, except APU, generator and transmission test.
- The selected system check is automatic and results are displayed on the CPG ORT HOD. All failed LRU NO-GOs for the selected system are displayed. The location of the failed LRU on the helicopter is also displayed.

Example: MAINTENANCE TEST MODE (FD/LS CHECK) NO-GO DISPLAY

```
AIR DATA PROCESSOR . . . . . . . . .  displayed on CPG ORT HOD
NO-GO AFT AVIONICS BAY
                                      (Code 01 - ADS selected)
```

- Prompter and advisory messages are displayed on the CPG ORT HOD when specific operator actions are required. These messages indicate operator actions required, actions required if switches and controls are not at correct positions, correct conditions do not exist, etc.

Example: PROMPT AND ADVISORY MESSAGE DISPLAY

```
ENGAGE PITCH AND ROLL . . displayed on CPG ORT HOD
SWITCHES ON ASE PANEL
          ACK VIA KBD
```

NOTE

Control/switch position changes prompted by FD/LS must be performed within 30 seconds of prompt message or false NO-GO message will appear.

- Operator performs action required and acknowledges completion by depressing correct keys on the DEK.

NOTE

New FD/LS message must appear on HOD within 2 seconds after prompted control/switch position change.

- Test in progress messages are automatically displayed on the ORT HOD to inform the operator that a specific test is still in progress. These message displays are used for specific FD/LS checks that require more time to complete. They inform the operator the check is in progress, but is not completed.

Example: TEST IN PROGRESS MESSAGE DISPLAY

DASE SYSTEM . . . . displayed on CPG ORT HOD
TEST IN PROGRESS

G Sequential Page Advance (Scrolling).

A maximum of four lines are displayed on the CPG ORT HOD. Four lines are a page of data on the display. To display the next page, it is necessary to scroll.

- The FD/LS checks menu is scrolled to advance and display the next page of information.

- When the end-of-list prompter **ANY KEY FOR FDLS MENU** is displayed, it indicates that all NO-GOs have been displayed.

- Scrolling may be continued to re-examine NO-GOs.

1-4-1. FAULT DETECTION/LOCATION SYSTEM (FD/LS) - GENERAL (cont)

H Systems and Equipment Checked by FD/LS.

The FD/LS checks systems and equipment as follows:

- Continuous Test Mode - Equipment Checked:

In this mode, FD/LS continuously checks the following equipment:

Equipment

Gun System
Rounds counter magazine controller
*Missiles and launchers
*Rockets system
*Pylon Articulation system
PNVS
PNVS servo module
PNVS video
IHADSS
IHADSS display
TADS
ORT column
TADS ECS
TADS LRF-D
TADS AND
TADS laser tracker
TADS IAT
TADS FLIR
TADS TV
TADS servos

Equipment

HARS
CPG FC panel
Data entry keyboard (DEK)
*Multiplex - MRTUs
Backup bus controller (BBC)
DASE
Air data sensor system (ADS)
Sight electronic unit
Auto stabilator
Ice detection equipment
Canopy temperature controller
Rotor blade de-ice distributor
Rotor blade de-ice controller
Main rotor heater
Tail rotor heater

---

*plus on-board location is displayed

- Continuous Test Mode - FD/LS Displays.

In the continuous mode, with **DATA ENTRY** switch on DEK at **STANDBY** or **OFF**, a flashing **FD/LS** is displayed on the ORT HOD and/or pilot VDU for any following listed failed mission essential equipment and LRUs. At the same time, the associated caution/warning indicator listed for that equipment lights.

Equipment

Multiplex (MUX) system
TADS
PNVS
Hellfire Missile Equipment (HME)
Gun
Rockets
Pylons
De-ice equipment

Equipment

Automatic Stabilization Equipment (ASE)
HARS
Stabilator
IHADSS
DEK
CPG fire control panel
BBC
Auxiliary Power Unit (APU)

Caution/Warning Indicators

Gun
Missile
Rocket
TADS
PNVS
ADS
De-ice rotor
Blade anti-ice fail
Canopy anti-ice fail
BUCS fail
ASE
APU fail

- Continuous Test Mode - NO-GO Displays:

At **FD/LS** position of **DATA ENTRY** switch on DEK, NO-GOs are displayed on the ORT HOD and/or pilot VDU for the equipment listed under Continuous Test Mode - FD/LS Displays. (A complete listing of the continuous test mode NO-GO message displays is in paragraph 1-4-7.)

1-4-1. FAULT DETECTION/LOCATION SYSTEM (FD/LS) - GENERAL (cont)

- Maintenance Test Mode - Equipment Checked:

  In this mode, as selected on the DEK, FD/LS checks line replaceable units (LRUs) in the following systems and equipment:

	Maintenance Test Mode Menu		
	Code	Symbol	Applicable TM
Air data system	01	ADS	*
Digital Automatic stabilization equipment (ASE)	02	DASE	*
De-ice equipment	03	DICE	*
Gun	04	GUN	**TM 9-1090-208-23-2
HARS	05	HARS	**TM 11-1520-238-23-2
IHADSS	06	IHDS	**TM 9-1270-221-23
Hellfire missile equipment (HME)	07	MSL	**TM 9-1427-475-20
Multiplex (MUX) system	08	MUX	**TM 9-1230-476-23-2
PNVS	09	PNVS	**TM 11-5855-265-20-1
Pylons	10	PYLN	*
Rockets	11	RKT	**TM 9-1090-208-23-2
Stabilator	12	STAB	*
Symbol generator	13	SYMG	**TM 11-5895-1184-23
TADS	14	TADS	**TM 9-1270-476-20-1
Utility system (and fire control equipment)	15	UTIL	*(**TM 9-1230-476-20-1)
FD/LS end-to-end check	16	ETE	*
Auxiliary power units	17	APU	*
Electrical system	18	GEN	*
Drive system	19	TRAN	*

*FD/LS checks contained in TM 55-1520-238-T (this manual).
**FD/LS checks contained in separate mission equipment TM.

NOTE

For information on the specific LRUs checked in the systems/equipment, refer to the listings in the FD/LS End-To-End Check (para 1-4-7).

- Maintenance Test Mode - FD/LS Displays:

  In the maintenance test mode, a GO is displayed on the ORT HOD for a functional system checked. NO-GOs and locations are displayed for all defective LRUs of the system checked. (A complete listing of all the maintenance test mode GOs and NO-GOs is in paragraph 1-4-7.)

I FD/LS End-To-End Check.

- The FD/LS end-to-end (ETE) check is used to completely check all systems/equipment operation, and/or complete operation of the FD/LS system. The end-to-end check is selected by maintenance tests mode menu code 16. It automatically performs, in a continuing uninterrupted sequence, all FD/LS checks for maintenance test mode menu codes 01 thru 15. (FD/LS checks for codes 17 thru 19 are not performed.)
- The operator has the option to pass or abort any test and continue to next test by depressing the DEK **ENTER SPACE** key, during the ETE test.
- The pass/abort mode during the ETE test is inhibited only if a prompt or advisory message is displayed.
- All NO-GOs and locations are displayed at completion of ETE check, and can be scrolled (G above).

J Boresighting Checks.

Boresight checks are selected using the FD/LS. A boresight check menu is provided for selecting the check desired.

- The **DATA ENTRY** switch on the DEK is set to **FD/LS.**
- To display the boresight check menu, the **B** key on the DEK is depressed.
- The boresight menu is automatically displayed on the CPG ORT HOD.

Example: BORESIGHT MENU DISPLAY

TADS	**AL-20**	**VF-21**	**ED-22**
GUN	**AL-23**	**VF-24**	**ED-25**
PYLN	**AL-26**	**VF-27**	**ED-28**
PNVS	**AL-29**	**VF-30**	**ED-31**

Legend:

AL - align
VF = verify
ED = edit

- The operator selects the boresight check desired by entering the code for that check on the DEK.
- Operator actions and acknowledgements are required to accomplish the selected boresight check.
- Control/switch position changes prompted by FD/LS must be performed within 30 seconds of prompt message or false NO-GO message will appear.
- New FD/LS message must appear on HOD within 2 seconds after prompted control/switch position change.
- For further information on and use of FD/LS for boresighting checks, refer to the applicable separate technical manuals.

1-4-2. USE OF FD/LS FOR TROUBLESHOOTING

A General.

The automatic FD/LS checks for systems/equipment reduces time for determining defective systems/equipment and their faulty LRUs. The FD/LS is used for troubleshooting as follows:

- The FD/LS continuous test mode is used to determine the faulty system/equipment.
- The FD/LS maintenance test mode displays the defective LRU and location in the affected system/equipment.
- The defective LRU is replaced or repaired, as applicable.
- The FD/LS check is repeated to be sure the LRU replacement or repair has corrected the trouble.

B Using the FD/LS.

Use the FD/LS as follows:

- Start FD/LS operation (para 1-4-3).
- Determine any system failures checked by FD/LS (para 1-4-3). (A NO-GO for any failed system is displayed.)
- For any failed system initiate the maintenance test mode (para 1-4-3), which displays the FD/LS checks menu.

NOTE

Scrolling is required if the system/equipment to be checked is listed on second page instead of first page.

- If required, scroll the menu (para 1-4-3) to display second page of the menu.
- Find the menu code number (para 1-4-1) for the system/equipment to be checked.
- Find the location for that FD/LS check in this manual or appropriate TM (para 1-4-1) and **HOW TO USE THIS VOLUME** at the front of this volume.
- Perform the FD/LS check using the instructions for the FD/LS check procedures in the applicable TM.

NOTE

Complete FD/LS checks for all systems/equipments (listed in the menu) are furnished in this volume and associated technical manuals (TMs). (All FD/LS checks for helicopter systems/equipment are in this manual. All FD/LS checks for other mission systems/equipment are in separate TMs.) Each specific FD/LS check contains complete instructions for performing the check.

- While performing the FD/LS check, perform any operator required actions using the DEK (para 1-4-4).
- For information on all FD/LS displays, refer to the complete listing of FD/LS displays (para 1-4-7).

1-4-3. FD/LS OPERATION - STARTING

Personnel Required:

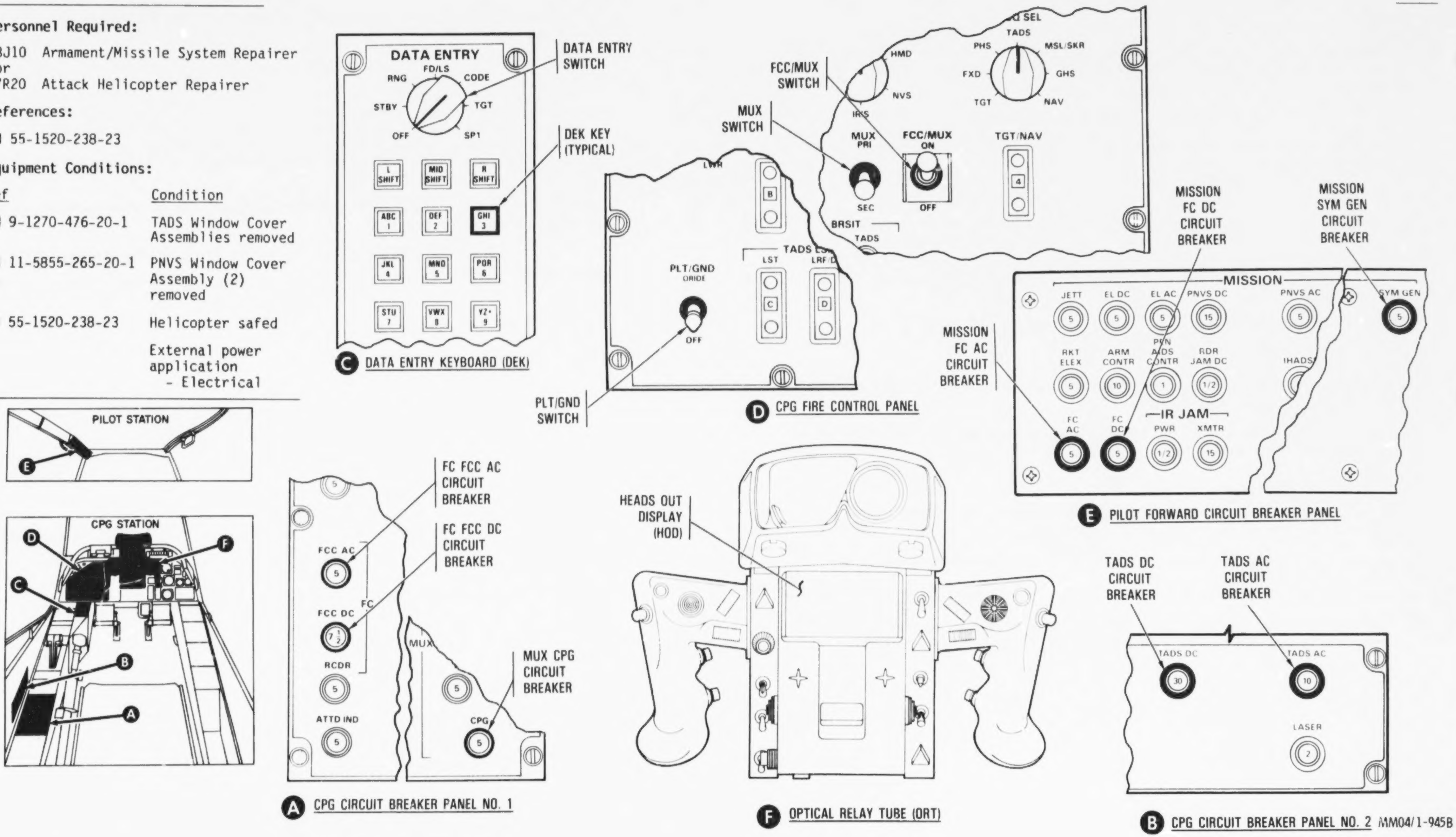
68J10 Armament/Missile System Repairer
or
67R20 Attack Helicopter Repairer

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 9-1270-476-20-1	TADS Window Cover Assemblies removed
TM 11-5855-265-20-1	PNVS Window Cover Assembly (2) removed
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical



C DATA ENTRY KEYBOARD (DEK)

D CPG FIRE CONTROL PANEL

E PILOT FORWARD CIRCUIT BREAKER PANEL

A CPG CIRCUIT BREAKER PANEL NO. 1

F OPTICAL RELAY TUBE (ORT)

B CPG CIRCUIT BREAKER PANEL NO. 2

MM04/1-945B

PILOT STATION
E
CPG STATION
D
F
C
B
A
DATA ENTRY
RNG
FD/LS
CODE
STBY
TGT
OFF
SP1
L SHIFT
MID SHIFT
R SHIFT
ABC 1
DEF 2
GHI 3
JKL 4
MNO 5
PQR 6
STU 7
VWX 8
YZ* 9
DATA ENTRY SWITCH
DEK KEY (TYPICAL)
FCC/MUX SWITCH
MUX SWITCH
SEL
TADS
PHS
MSL/SKR
HMD
FXD
GHS
NVS
TGT
NAV
IRS
MUX PRI
SEC
FCC/MUX ON
OFF
TGT/NAV
4
BRSIT
TADS
LWR
B
TADS LS
LST
LRF D
C
D
PLT/GND ORIDE
OFF
PLT/GND SWITCH
MISSION FC DC CIRCUIT BREAKER
MISSION SYM GEN CIRCUIT BREAKER
MISSION FC AC CIRCUIT BREAKER
MISSION
JETT
EL DC
EL AC
PNVS DC
PNVS AC
SYM GEN
RKT ELEX
ARM CONTR
PNVS ADS CONTR
RDR JAM DC
IHADS
FC AC
FC DC
IR JAM
PWR
XMTR
5
15
10
1
1/2
FC FCC AC CIRCUIT BREAKER
FC FCC DC CIRCUIT BREAKER
FCC AC
FCC DC
7 1/2
FC
RCDR
ATTD IND
MUX
CPG
MUX CPG CIRCUIT BREAKER
HEADS OUT DISPLAY (HOD)
TADS DC CIRCUIT BREAKER
TADS AC CIRCUIT BREAKER
TADS DC
TADS AC
30
LASER
2

1-4-3. FD/LS OPERATION - STARTING (cont)

A Initiate FD/LS operation as follows:

TASK RESULT

1. On CPG circuit breaker panel No. 1, check that following circuit breakers are closed:

   FC FCC AC
   FC FCC DC
   MUX CPG
   MUX L PYL OUTBD
   MUX L PYLON INBD
   MUX R PYL OUTBD
   MUX R PYL INBD
   MUX FAB L
   MUX FAB R

2. On pilot forward circuit breaker panel, check that following circuit breakers are closed:

   MISSION FC AC
   MISSION FC DC
   MISSION SYM GEN

NOTE

When troubleshooting, all circuit breakers are normally closed (para 1-1-1). In the following procedures, systems checked by the FD/LS must have electrical power applied, to avoid flashing or NO-GO display(s). (Flashing or NO-GO display(s) occur if the associated system is not on, or a trouble exists in the system.) Power up procedures and circuit breakers for the separate systems are in the applicable technical manual for the system (para 1-4-1).

Refer to the applicable technical manual for the symptom if NO-GO display(s) appear. Refer to TM 9-1230-476-20-2 if flashing appears.

3. Check that all circuit breakers for all systems to be checked by FD/LS (para 1-4-1) are closed (on).

TASK	RESULT
4. On CPG **FIRE CONTROL** panel, set switches as follows:	

Switch	Position (set to)
MUX	PRI
FCC/MUX	ON
PLT/GND	ORIDE
SYSTEM FC SYM GEN	FC SYM GEN

NOTE

- FD/LS system is now in continuous mode of operation. Displays in step 6 appear when **DATA ENTRY** switch is set to **STBY.**
- Perform step 5 only if TADS operation is required. (Closed **FC SYM GEN** switch provides FD/LS display on ORT HOD without TADS energized.)
- Perform step 7 (maintenance mode) if individual system tests are required.
- If symbology is not displayed, or PRI MUX indicators light, refer to TM 9-1230-476-20-2.

5. On CPG circuit breaker panel no. 2, check that following circuit breakers are closed:

   TADS AC
   TADS DC

TASK	RESULT
6. Check that **DATA ENTRY** switch on DEK is set to **STBY.** Check heads out display (HOD) of ORT.	No flashing display on the HOD.
Note and record names of any and all indicators (para 1-4-1) lighted on pilot and CPG caution/warning panels.	Any mission essential or flight critical system NO-GO is indicated by a flashing **FD/LS** display on the HOD, and an associated indicator lighting on the pilot and/or CPG caution/warning panel.

NOTE

- Specific NO-GOs cause associated caution/warning indicators on pilot and/or CPG caution/warning panels to flash. (To stop indicator(s) flashing, depress **MASTER CAUTION** indicators on pilot and CPG master caution/warning panels.) Flashing FD/LS display on HOD stops when Data Entry switch is set to **FD/LS.**

1-4-3. FD/LS OPERATION - STARTING (cont)

NOTE

- If no faults are detected refer to (para 1-4-6).
- If faults (NO-GOs) are detected, perform step 8 to follow-up with individual system faults.

TASK	RESULT
7. Set **DATA ENTRY** switch to **FD/LS** (maintenance mode) positon. Check HOD for any NO-GO display. If any appear, note and record the system (para 1-4-1). To scroll the menu, press **ENTER SPACE** key on the DEK. For any NO-GO display, determine the FD/LS check menu code (para 1-4-1).	For any mission essential system failure a NO-GO is displayed on the HOD.

NOTE

Any NO-GO displayed is limited to one of the displays listed for the system(s)/equipment checked by the FD/LS in the continuous test mode (para 1-4-1). The exact NO-GO displayed for that system/equipment is listed in the CONTINUOUS TEST MODE NO-GO DISPLAYS (para 1-4-7).

TASK	RESULT
8. Press any key on the DEK, except **SHIFT** or **ENTER SPACE** key.	First page of the FD/LS checks menu (para 1-4-1) is displayed on the HOD. If FD/LS menu does not appear on HOD, refer to TM 9-1230-476-20-2 to troubleshoot the multiplex subsystem.
9. Depress DEK keys **0** (zero) and **8**.	
When **MUX COMMUNICATION GO** appears on HOD, go to next step.	If any **MUX NO-GO** appears on HOD, refer to TM 9-1230-476-20-2 to troubleshoot multiplex subsystem.
10. Select and record the numbered code for:	
Any system/equipment for which a flashing FD/LS display occurred in step 6.	
Any system/equipment for which a NO-GO was displayed in step 7.	

TASK	RESULT
11. If numbered code(s) for the system or equipment are not in page 1 of the FD/LS checks menu, depress **ENTER SPACE** key on the DEK.	FD/LS checks menu is scrolled (para 1-4-1), and second page of the menu is displayed on the HOD.
12. If step 11 is performed, perform step 10 above.	

NOTE

- FD/LS checks for the desired separate system/equipment can now be selected using the applicable number code.
- Complete instructions for performing all the FD/LS checks, and the exact NO-GO displays that occur, are in the applicable technical manual.

13. Perform the FD/LS check for the selected system. (Refer to the technical manual for that system (para 1-4-1.)	GOs, and NO-GOs and locations of LRUs of the selected system are displayed on the HOD.

NOTE

- Control/switch position changes prompted by FD/LS must be performed within 30 seconds of prompt message, or false NO-GO message will appear.
- If FD/LS message does not change within 2 seconds after prompted control/switch position change (acknowledge), discontinue FD/LS test and perform system maintenance operational check (MOC).

14. Perform any operator required actions (acknowledgements, YES or NO answers, etc.) during the FD/LS check (para 1-4-4).	Operator actions are completed and FD/LS check progresses to completion.

1-4-4. USE OF DEK FOR FD/LS OPERATION - GENERAL

NOTE

Specific instructions for performing FD/LS checks are contained in applicable technical manuals. The following procedures contain general operating information for use of the DEK during FD/LS operation. These procedures also contain instructions for operator actions that may or may not be required at varying times due to equipment conditions or situations.

A. For operation of the FD/LS, use the DEK as follows:

NOTE

Step B is an example to start FD/LS check that is specified in the applicable technical manual. (Actual instructions for performance of step B is in the FD/LS check instructions in that manual.) When step B is performed, the FD/LS maintenance check automatically occurs.

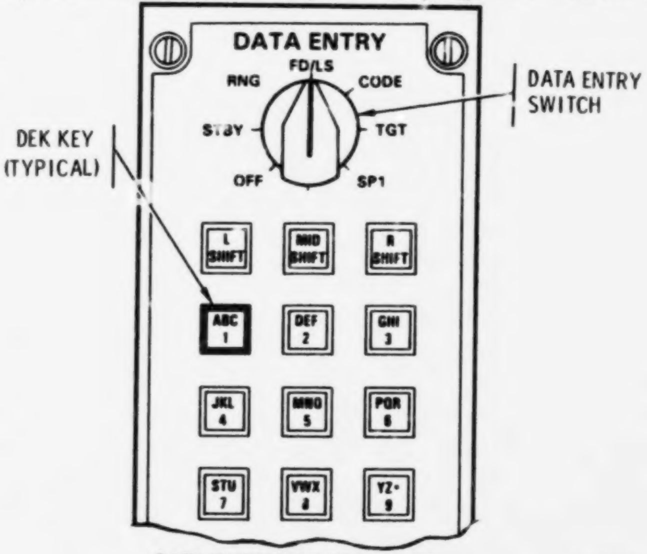
B. Perform the FD/LS check as instructed in the applicable technical manual, including the following steps:

1. On the DEK, set **DATA ENTRY** switch to **FD/LS**, depress any key except **SHIFT** or **ENTER SPACE** key to display the first page of the FD/LS menu.

NOTE

If FD/LS menu does not appear on HOD, refer to TM 9-1230-476-20-2 to troubleshoot the multiplex subsystem.

If necessary, depress **ENTER SPACE** key to display the second page of the FD/LS menu.


DATA ENTRY
FD/LS
RNG
CODE
STBY
TGT
OFF
SP1
DATA ENTRY SWITCH
DEK KEY (TYPICAL)
L SHIFT
MID SHIFT
R SHIFT
ABC 1
DEF 2
GHI 3
JKL 4
MNO 5
PQR 6
STU 7
VWX 8
YZ• 9

DATA ENTRY KEYBOARD (DEK)

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2. On the DEK, enter the system code number from the menu (refer to para 1-4-1) for the system to be checked.

3. When the system code number is entered on the DEK, the FD/LS maintenance check automatically occurs; any **NO-GOs** along with the location of the faulty LRUs in the selected system are displayed on the CPG station ORT HOD and, if desired, on the pilot station VDU. (This is accomplished by setting the **TEST/PLT/CPG** switch on the pilot VDU panel to **CPG.**)

4. If the system is not faulty, a **GO** message (para 1-4-7) is displayed.

NOTE

For certain equipment conditions and situations, operator action (acknowledgement or answer, etc.) may be required during the FD/LS check. (Steps C and D provide instructions for operator acknowledgement, and step E for operator answering.)

Control/switch position changes prompted by FD/LS must be performed within 30 seconds of prompt message, or false NO-GO message will appear.

C. If a prompt and advisory message which requires an acknowledgement is received, perform the functions as stated in the message.

D. To acknowledge that the necessary actions have been performed, depress **ENTER SPACE** key on the DEK. The FD/LS automatically proceeds.

If FD/LS message does not change within 2 seconds after prompted control/switch position change (acknowledge), discontinue FD/LS test and perform system maintenance operational check (MOC).

1-4-4. USE OF DEK FOR FD/LS OPERATION - GENERAL (cont)

E. If a prompt and advisory message display (para 1-4-7) which requires a Y (YES) or N (NO) answer is received, check the specified condition.

NOTE

> Shift keys (**L SHIFT MID SHIFT** and **R SHIFT**) are used to select left, center, or right character (letter) for entry for YES and NO answers during prompt and advisory message displays. (Shift keys are used only for YES and NO answers.)

1. If the answer is yes, depress the **L SHIFT** key and then the **YZ** key (Y or YES). FD/LS automatically continues.

2. If the answer is no, depress the **MID SHIFT** key and then the **MNO** key (N for NO). FD/LS automatically continues.

F. After all troubles have been repaired, depress **ENTER SPACE** key on DEK. The message **ANY KEY FOR FD/LS MENUS** is displayed. Depress any key, except **SHIFT** or **ENTER SPACE** key. The first page of the FD/LS menu is displayed. To perform another FD/LS, perform, steps A and B.

G. To terminate the FD/LS check, depress the **ENTER SPACE** key or set the **DATA ENTRY** switch to **STBY.**

NOTE

There are two continuous test modes. One, with the **DATA ENTRY** switch on the DEK at **STBY,** displays a flashing FD/LS on the ORT HOD and/or pilot VDU. At the same time the associated caution/warning indicator for that equipment lights to provide indication of mission essential system failures.

The other continuous test mode, with the **DATA ENTRY** switch at FD/LS, provides **NO-GO** display indications of mission essential equipment failure.

H. To select continuous test mode operation for FD/LS displays, set **DATA ENTRY** switch on DEK at any position except **FD/LS** (refer to para 1-4-1).

I. To select maintenance test mode for mission essential failure NO-GO displays, set **DATA ENTRY** switch to **FD/LS** (refer to para 1-4-1) after performing step H.

1-4-5. FD/LS - END-TO-END (ETE) - CHECK

Personnel Required:

68J10	Aircraft Fire Control Repairer
67R20	Attack Helicopter Repairer

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (primary)
Para 1-3-2	ICS connected
Para 1-4-3	FD/LS OPERATION - STARTING completed

NOTE

- The FD/LS end-to-end check is to be used only for specific purposes (para 1-4-1). It is not normally used for routine and ordinary maintenance. Performing this check when not required can result in unnecessary usage and exercise of FD/LS and other systems functions.

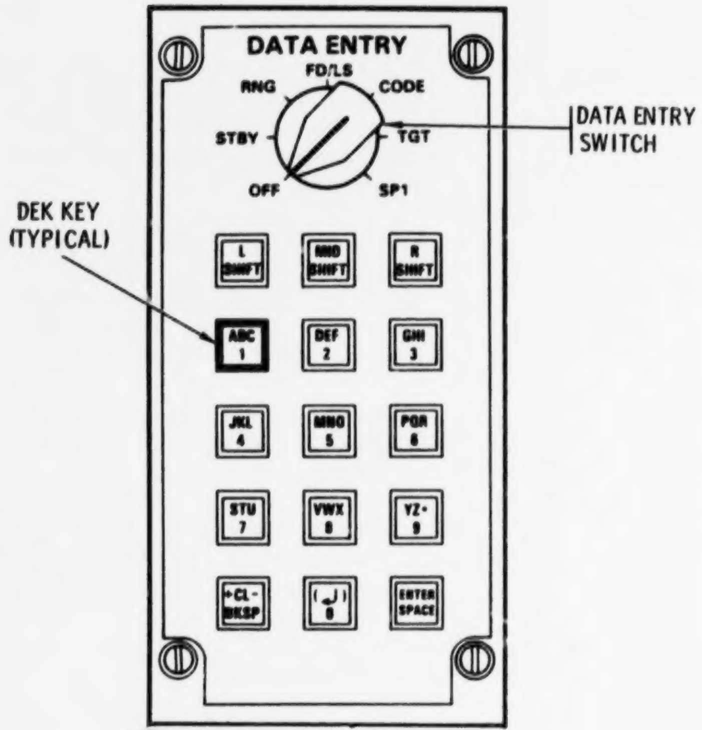
- For a helicopter with BUCS deactivated, after prompting and correct operator responses, a **HARS TEST IN PROGRESS** display and a pause occurs. After further prompting and responses, the ETE check continues with **de-ice** FD/LS check, but skips remaining DASE FD/LS check displays.

- Control/switch position changes prompted by FD/LS must be performed within 30 seconds of prompt message, or a false **NO-GO** message will appear.

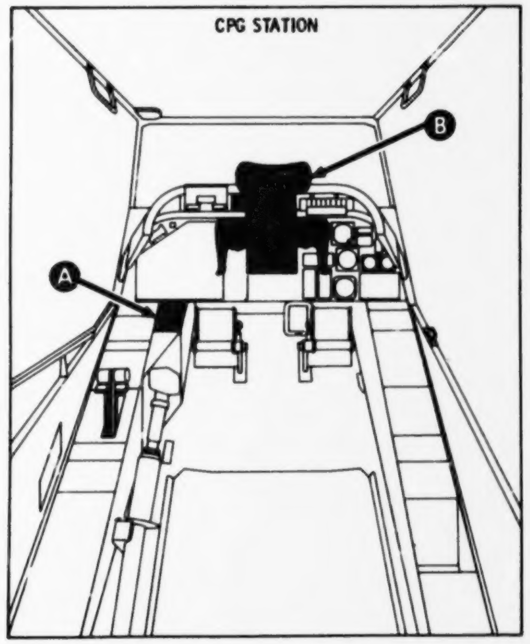
- If FD/LS message on heads out display (HOD) does not change within 2 seconds after prompted control/switch position change (acknowledge), discontinue FD/LS test and go to applicable system MOC.

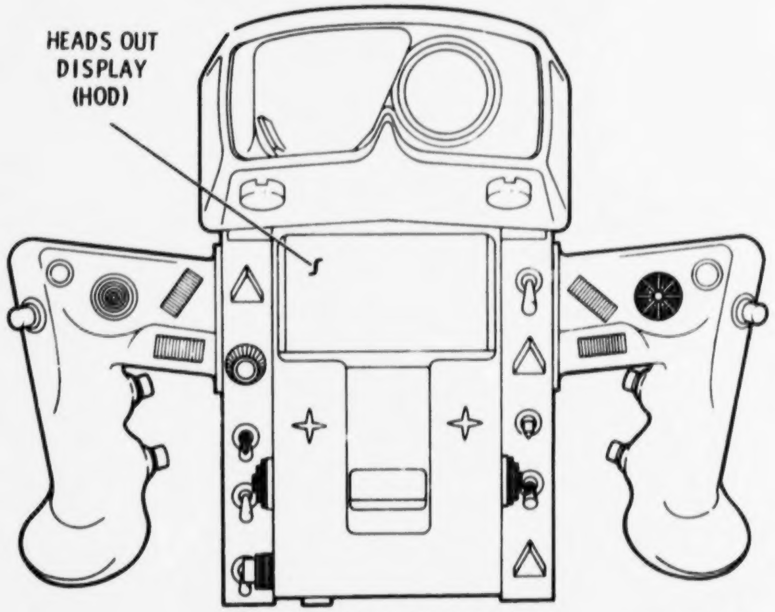
GO TO NEXT PAGE

1-4-5. FD/LS - END-TO-END (ETE) - CHECK (cont)



A DATA ENTRY KEYBOARD (DEK)





B OPTICAL RELAY TUBE (ORT)

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A. Complete the FD/LS END-TO-END check as follows:

TASK	RESULT
1. On data entry keyboard (DEK) check **DATA ENTRY** switch is set at **FD/LS.**	
2. Depress any DEK key except **ENTER SPACE** or **SHIFT** key.	If FD/LS menu does not appear on HOD, refer to TM 9-1230-476-20-2 to troubleshoot the multiplex subsystem.
3. Depress DEK keys **0** (zero) and **8.**	
When **MUX COMMUNICATION GO ANY KEY FOR FD/LS MENUS** appears on HOD, go to next step.	If any **MUX NO-GO** appears on HOD, refer to TM 9-1230-476-20-2 to troubleshoot multiplex subsystem.
4. On DEK panel, depress any key except **ENTER SPACE** or **SHIFT**, then depress keys **1** and **6.**	All FD/LS maintenance test mode checks (FD/LS checks) for all systems with numbered codes 01 thru 15 are automatically and sequentially made. Any NO-GOs for any of the systems checked are displayed on the HOD.

NOTE

As end-to-end check if performed, the FD/LS system automatically performs all the FD/LS checks that are contained in all applicable technical manuals. The checks are performed in the sequence of the FD/LS maintenance test codes (para 1-4-1), starting with number code 01. Periodically, as necessary, pauses in the test automatically occur, and prompt and advisory displays (para 1-4-1) and test in progress displays (para 1-4-1) may appear on the HOD.

TASK	RESULT
5. When check is complete, check the HOD. Note and record any NO-GO displays, or that all systems are GO.	Any and all NO-GOs for any defective LRUs are displayed on the HOD. If no fault exists in all systems, **NO FAULTS DETECTED ALL SYSTEMS ARE GO** is displayed (para 1-4-7).

NOTE

NO-GO displays are limited to the displays listed in the MAINTENANCE TEST MODE NO-GOs (para 1-4-7).

B. Perform applicable system FD/LS checks for each NO-GO recorded.

C. Perform FD/LS OPERATION - STOPPING (para 1-4-6).

END OF TASK

1-4-6. FD/LS OPERATION - STOPPING

Personnel Required:

Nomenclature

68J10 Aircraft Fire Control Repairer
or
67R20 Attack Helicopter Repairer

References:

TM 55-1520-238-23
TM 11-5855-265-20-1
TM 9-1270-476-20-1

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical
TM 11-5855-265-20-1	PNVS window cover assy (2) removed
TM 9-1270-476-20-1	TADS window cover assemblies removed
Para 1-4-3	FD/LS OPERATION - STARTING completed

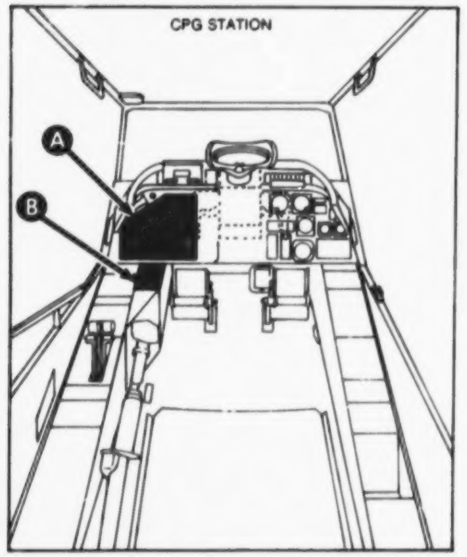
A. On DEK, set **DATA ENTRY** switch to **OFF.**

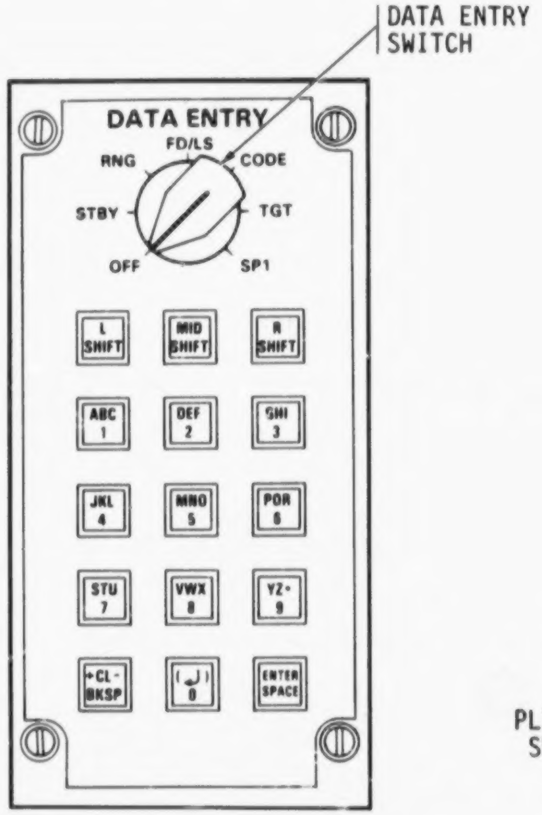
NOTE

If an operational check is to be performed following the FD/LS check, do not perform steps B and C, below, or the power down procedures for the system that is to be checked.

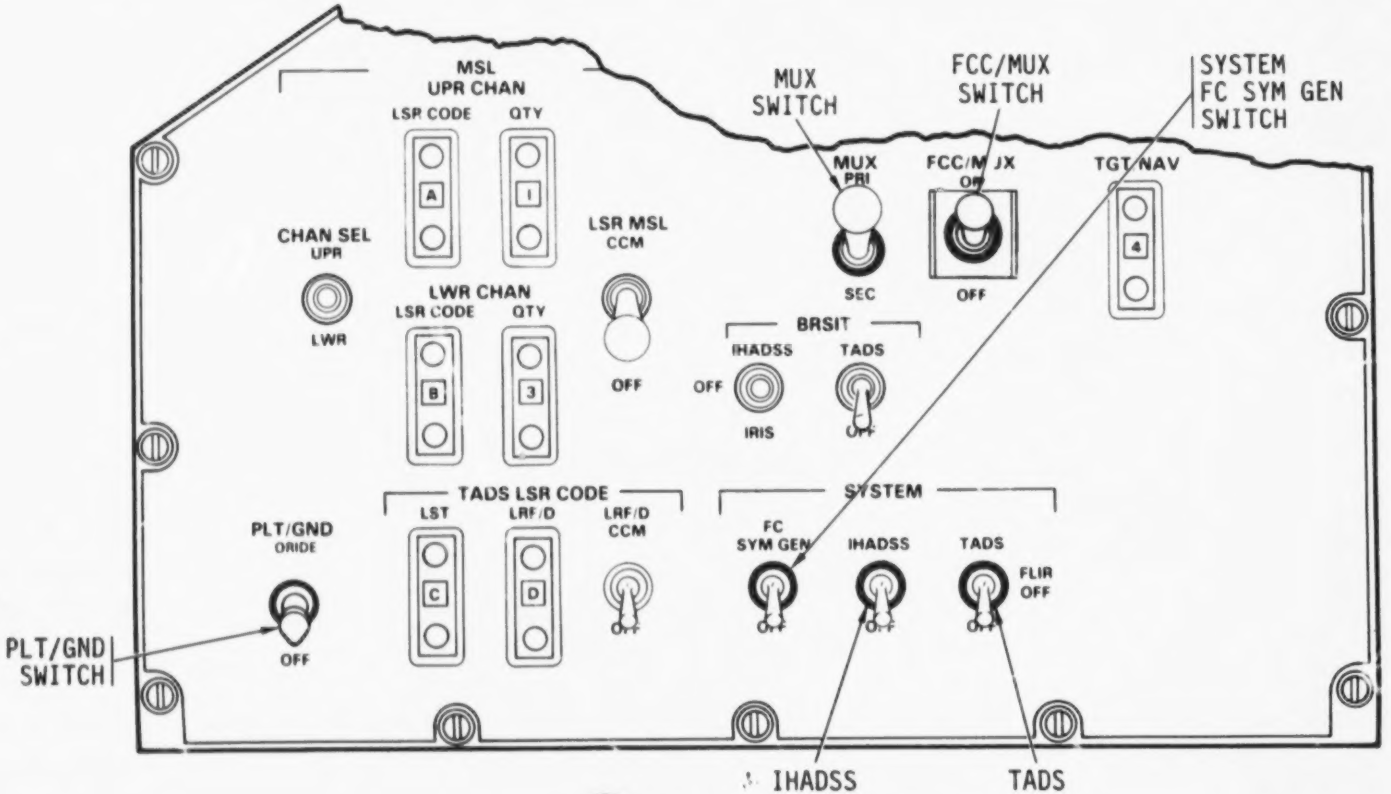
B. On CPG **FIRE CONTROL** panel, set the following switches as follows:

Name	Position (set to)
MUX	PRI
FCC/MUX	ON
SYSTEM FC SYM GEN	OFF
SYSTEM TADS	OFF
SYSTEM IHADSS	OFF
PLT/GND	OFF


CPG STATION
A
B


DATA ENTRY SWITCH
DATA ENTRY
FD/LS
RNG
CODE
STBY
TGT
OFF
SP1
L SHIFT
MID SHIFT
R SHIFT
ABC 1
DEF 2
GHI 3
JKL 4
MNO 5
PQR 6
STU 7
VWX 8
YZ• 9
←CL→ BKSP
0
ENTER SPACE

B DATA ENTRY KEYBOARD (DEK)


MUX SWITCH
FCC/MUX SWITCH
SYSTEM FC SYM GEN SWITCH
MSL
UPR CHAN
LSR CODE
QTY
A
1
CHAN SEL
UPR
LWR
LSR MSL
CCM
OFF
LWR CHAN
LSR CODE
QTY
B
3
MUX
PRI
SEC
FCC/MUX
ON
OFF
TGT/NAV
4
BRSIT
IHADSS
TADS
OFF
IRIS
OFF
TADS LSR CODE
LST
LRF/D
LRF/D CCM
C
D
OFF
SYSTEM
FC SYM GEN
IHADSS
TADS
FLIR
OFF
OFF
OFF
PLT/GND ORIDE
OFF
PLT/GND SWITCH
IHADSS
TADS

A CPG FIRE CONTROL PANEL

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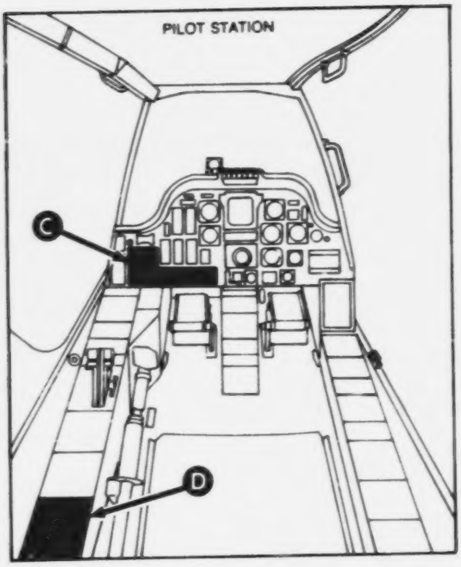
1-4-6. FD/LS OPERATION - STOPPING (cont)

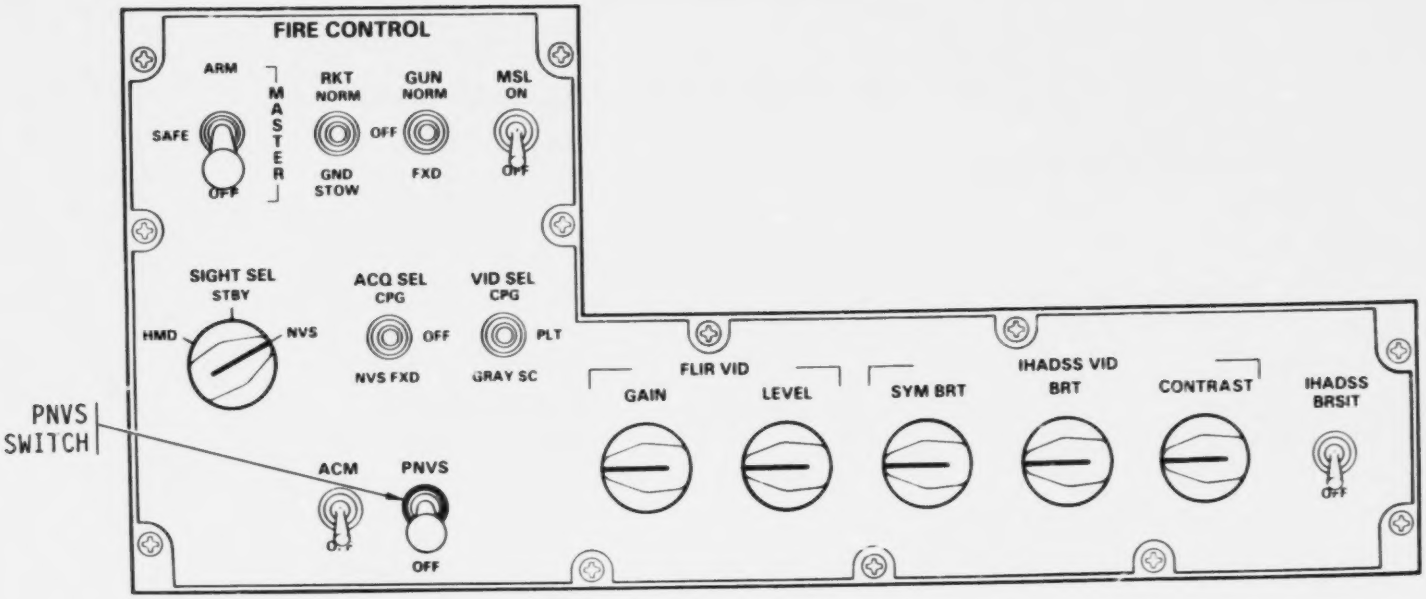
C. On Pilot's **FIRE CONTROL** panel, set **PNVS** switch to **OFF**.

D. On Pilot's **ANTI-ICE** panel, set **HTR** switch to **OFF**.

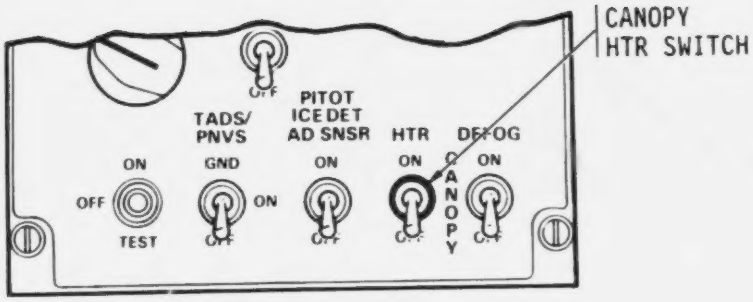
E. Shut down and remove GPU as required (TM 55-1520-238-23).

F. Perform helicopter safing procedure (TM 55-1520-238-23).




FIRE CONTROL
ARM
SAFE
OFF
MASTER
RKT
NORM
GND
STOW
GUN
NORM
OFF
FXD
MSL
ON
OFF
SIGHT SEL
STBY
HMD
NVS
ACQ SEL
CPG
OFF
NVS FXD
VID SEL
CPG
PLT
GRAY SC
FLIR VID
GAIN
LEVEL
SYM BRT
IHADSS VID
BRT
CONTRAST
IHADSS
BRSIT
OFF
PNVS SWITCH
ACM
OFF
PNVS
OFF

Ⓒ PILOT FIRE CONTROL PANEL


CANOPY HTR SWITCH
OFF
TADS/
PNVS
PITOT
ICE DET
AD SNSR
HTR
DEFOG
ON
OFF
TEST
GND
ON
OFF
ON
OFF
ON
CANOPY
OFF
ON
OFF

Ⓓ PILOT ANTI-ICE PANEL

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1-4-7. FD/LS DISPLAYS - COMPLETE LISTING

This paragraph contains a complete listing of all FD/LS displays (para 1-4-1) that may be displayed. A separate listing is provided for each type of different displays. The different displays are as follows:

- MAINTENANCE TEST MODE ERROR MESSAGES (NO-GOs)
- GO MESSAGES
- CONTINUOUS TEST MODE ERROR MESSAGES (NO-GOs)
- TEST IN PROGRESS MESSAGES
- PROMPT AND ADVISORY MESSAGES
- KEYBOARD ENTRY MENU ADDRESSES

A MAINTENANCE TEST MODE (FD/LS CHECK) NO-GOs

Sequence No.	System	NO-GO Display
1	ADS	OMNI DIR AIRSPEED SENSOR NO-GO MAIN ROTOR MAST
2	ADS	AIR DATA PROCESSOR NO-GO AFT AVIONICS BAY
3	SPARE	
4	DICE	CANOPY TEMP CONTROLLER NO-GO CPG COMPARTMENT
5	DICE	CANOPY TEMP SENSOR NO-GO CPG FR WINDSHIELD
6	DICE	TAIL ROTOR HEATER NO-GO TAIL ROTOR
7	DICE	MAIN ROTOR HEATER NO-GO MAIN ROTOR
8	DICE	RTR BLADE DISTR DE-ICE NO-GO MAIN RTR MAST
9	DICE	RTR BLADE PWR CONTROLLER NO-GO RH XMSN BAY
10	DICE	ICE DET SIGN PROCESSOR NO-GO FIREWALL LH SIDE
11	DICE	ICE DETECTOR CONTROLLER NO-GO FIREWALL LH SIDE
12	DICE	ICE DETECTOR SENSOR NO-GO ENG INLET LH SIDE
13	GUN	GUN TURRET CONTROL BOX NO-GO RH FAB
14	GUN	GUN CONTROL BOX NO-GO RH FAB
15	GUN	RNDS CNTR-MAG CONTROLLER NO-GO AFT OF LH FAB
16	HARS	HARS ELECTRONICS UNIT NO-GO AFT AVIONICS BAY
17	IHDS	SEU NO-GO RH FAB
18	IHDS	PILOT HELMET ELECTRONICS NO-GO
19	IHDS	PILOT RIGHT SSU NO-GO PILOTS COMPARTMENT
20	IHDS	PILOT LEFT SSU NO-GO PILOTS COMPARTMENT
21	IHDS	CPG HELMET ELECTRONICS NO-GO
22	IHDS	CPG RIGHT SSU NO-GO CPG COMPARTMENT
23	IHDS	CPG RIGHT SSU NO-GO COMPARTMENT
24	IHDS	PILOT DAP OR HDU NO-GO PILOTS COMPARTMENT
25	IHDS	CPG DAP OR HDU NO-GO CPG COMPARTMENT
26	IHDS	DEU NO-GO RH FAB
27	MSL	REMOTE HELLFIRE ELECT NO-GO RH FAB
28	MSL	MISSILE LAUNCHER NO-GO LT OUTBD
29	MSL	MISSILE LAUNCHER NO-GO LT INBD
30	MSL	MISSILE LAUNCHER NO-GO RT INBD
31	MSL	MISSILE LAUNCHER NO-GO RT OUTBD
32	MSL	MISSILE 4 NO-GO RT OUTBD
33	MSL	MISSILE 3 NO-GO RT OUTBD
34	MSL	MISSILE 2 NO-GO RT OUTBD
35	MSL	MISSILE 1 NO-GO RT OUTBD
36	MSL	MISSILE 4 NO-GO RT INBD
37	MSL	MISSILE 3 NO-GO RT INBD
38	MSL	MISSILE 2 NO-GO RT INBD
39	MSL	MISSILE 1 NO-GO RT INBD
40	MSL	MISSILE 4 NO-GO LT INBD
41	MSL	MISSILE 3 NO-GO LT INBD
42	MSL	MISSILE 2 NO-GO LT INBD
43	MSL	MISSILE 1 NO-GO LT INBD
44	MSL	MISSILE 4 NO-GO LT OUTBD
45	MSL	MISSILE 3 NO-GO LT OUTBD
46	MSL	MISSILE 2 NO-GO LT OUTBD
47	MSL	MISSILE 1 NO-GO LT OUTBD
48	MUX	TYPE IIIA MRTU NO-GO CPG COMPARTMENT
49	MUX	TYPE I MRTU NO-GO LH FAB
50	MUX	TYPE I MRTU NO-GO RH FAB
51	MUX	DASE MRTU NO-GO AFT AVIONICS BAY

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont)

A MAINTENANCE TEST MODE (FD/LS CHECK) NO-GOs (cont)

Sequence No.	System	NO-GO Display	Sequence No.	System	NO-GO Display	Sequence No.	System	NO-GO Display
52	MUX	TYPE II MRTU NO-GO LT OUTBD	66	EXST	PYLN ACTUATOR CONTROLLER NO-GO LT INBD	80	STAB	BOTTOM STAB ACTUATOR NO-GO TAIL SECTION
53	MUX	TYPE II MRTU NO-GO LT INBD	67	EXST	PYLN ACTUATOR CONTROLLER NO-GO LT OUTBD	81	SYGN	SYMBOL GENERATOR NO-GO LH FAB
54	MUX	TYPE II MRTU NO-GO RT INBD	68	RKT	ROCKET CONTROL PANEL NO-GO PILOTS COMPARTMENT	82	TADS	AND NO-GO CPG COMPARTMENT
55	MUX	TYPE II MRTU NO-GO RT OUTBD	69	RKT	STATION DIRECTOR NO-GO LT OUTBD	83	TADS	TADS LASER TRANSCEIVER NO-GO DSA
56	GUN	TRAIN RATE SENSOR NO-GO GUN TURRET ASSY	70	RKT	STATION DIRECTOR NO-GO LT INBD	84	TADS	TADDS LASER ELECTRONICS NO-GO LH FAB
57	MUX	EXCESSIVE MSG ERRORS - MUX NO-GO	71	RKT	STATION DIRECTOR NO-GO RT INBD	85	TADS	TADS POWER SUPPLY NO-GO LH FAB
58	PNVS	PNVS AZ GEAR NO-GO TURRET BULKHEAD	72	RKT	STATION DIRECTOR NO-GO RT OUTBD	86	TADS	TADS ELECTRONIC UNIT NO-GO LH FAB
59	PNVS	PNVS TORQUER AMP NO-GO TURRET BULKHEAD	73	STAB	STAB CONTROL UNIT 1 NO-GO LH AFT CATWALK	87	TADS	TADS ECS ASSEMBLY NO-GO TURRET BULKHEAD
60	PNVS	PNVS TURRET NO-GO	74	STAB	STAB CONTROL UNIT 2 NO-GO LH AFT CATWALK	88	TADS	TADS IVD-HDD ELECTRONICS NO-GO CPG COMPARTMENT
61	PNVS	PNVS ELECTRONICS UNIT NO-GO RH FAB	75	STAB	RATE GYRO 1 NO-GO LH AFT CATWALK	89	TADS	BORESIGHT MODULE NO-GO TURRET BULKHEAD
62	PNVS	PNVS SHROUD NO-GO	76	STAB	RATE GYRO 2 NO-GO RH AFT CATWALK	90	TADS	TADS TV SHROUD NO-GO DSA
63	EXST	EXT STORES CONTROL BOX NO-GO AFT OF LH FAB	77	STAB	AIRSPEED TRANSDUCER 1 NO-GO LH XMSN BAY	91	TADS	TADS FLIR SHROUD NO-GO NSA
64	EXST	PYLN ACTUATOR CONTROLLER NO-GO RT OUTBD	78	STAB	AIRSPEED TRANSDUCER 2 NO-GO RH XMSN BAY	92	TADS	TADS LASER TRACKER NO-GO DSA
65	EXST	PYLN ACTUATOR CONTROLLER NO-GO RT INBD	79	STAB	TOP STAB ACTUATOR NO-GO TAIL SECTION	93	TADS	TADS TORQ-SERVO MODULE NO-GO TURRET BULKHEAD

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont)

A MAINTENANCE TEST MODE (FD/LS CHECK) NO-GOs (cont)

Sequence No.	System	NO-GO Display
94	TADS	TADS PITCH GYRO NO-GO DSA
95	TADS	TADS YAW GYRO NO-GO DSA
96	TADS	TADS ROLL GYRO NO-GO DSA
97	TADS	TADS DSA SUB-ASSY NO-GO DSA
98	TADS	TADS NIGHT SENSOR NO-GO NSA
99	TADS	ORT COLUMN ASSY NO-GO CPG COMPARTMENT
100	TADS	ORT HOD CONTROLS NO-GO CPG COMPARTMENT
101	TADS	TADS AC TORQUER AMP NO-GO TURRET BULKHEAD
102	TADS	TADS TV SENSOR NO-GO DSA
103	TADS	ORT LEFT HAND GRIP NO-GO CPG COMPARTMENT
104	TADS	ORT RIGHT HAND GRIP NO-GO CPG COMPARTMENT
105	GUN	GUN BORESIGHT NO-GO RAM CHECKSUM
106	EXST	PYLON BORESIGHT NO-GO RAM CHECKSUM
107	TADS	TADS BORESIGHT NO-GO RAM CHECKSUM
108	PNVS	PNVS BORESIGHT NO-GO RAM CHECKSUM
109	UTIL	BACKUP BUS CONTROLLER NO-GO CPG COMPARTMENT
110	UTIL	CPG FIRE CONTROL PANEL NO-GO CPG COMPARTMENT
111	UTIL	DATA ENTRY KEYBOARD NO-GO CPG COMPARTMENT
112	APU	APU NO-GO OVERTEMP
113	APU	APU NO-GO START RELAY
114	APU	APU NO-GO UNDERSPEED
115	APU	APU NO-GO IGNITION NOT ON
116	APU	APU NO-GO FUEL SOL NOT ON
117	APU	APU NO-GO PTO CLUTCH
118	APU	APU NO-GO IGNITION NOT OFF
119	APU	APU NO-GO LOW OIL PRESS
120	APU	APU NO-GO OVERSPEED
121	APU	APU NO-GO OVERCURRENT
122	GEN	GENERATOR 1 NO-GO LH XMSN BAY
123	GEN	GENERATOR 2 NO-GO RH XMSN BAY
124	GEN	GENERATOR 1 CONTROL NO-GO PLT ELEC PWR CTR
125	GEN	GENERATOR 2 CONTROL NO-GO PLT ELEC PWR CTR
126	SPARE	
127	SPARE	
128	ASE	BUCS TRACER NO-GO
129	ASE	28 VDC BUCS NO-GO
130	ASE	26 VAS EXCITATION XFMR 2 NO-GO AFT AVIONICS BAY
131	ASE	26 VAC EXCITATION XFMR 1 NO-GO AFT AVIONICS BAY
132	SPARE	
133	ASE	DASE ENGAGE PANEL NO-GO PLT COMPARTMENT
134	ASE	COLL ACTUATOR NO-GO RH XMSN BAY
135	ASE	DIR ACTUATOR NO-GO TAIL SECTION

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont)

A MAINTENANCE TEST MODE (FD/LS CHECK) NO-GOs (cont)

Sequence No.	System	NO-GO Display	Sequence No.	System	NO-GO Display	Sequence No.	System	NO-GO Display
136	ASE	LAT ACTUATOR NO-GO LH XMSN BAY	150	ASE	PILOT DIR 2 DCPLR NO-GO PLT COMPARTMENT	164	ASE	CPG COLL 2 DCPLR NO-GO CPG COMPARTMENT
137	ASE	LONG ACTUATOR NO-GO RH XMSN BAY	151	ASE	PILOT DIR 1 DCPLR NO-GO PLT COMPARTMENT	165	ASE	CPG COLL 1 DCPLR NO-GO CPG COMPARTMENT
138	SPARE		152	ASE	PILOT LAT 2 DCPLR NO-GO PLT COMPARTMENT	166	ASE	CPG DIR 2 DCPLR NO-GO CPG COMPARTMENT
139	SPARE		153	ASE	PILOT LAT 1 DCPLR NO-GO PLT COMPARTMENT	167	ASE	CPG DIR 1 DCPLR NO-GO CPG COMPARTMENT
140	ASE	AIR DATA PROCESSOR NO-GO AFT AVIONICS BAY	154	ASE	PILOT LONG 2 DCPLR NO-GO PLT COMPARTMENT	168	ASE	CPG LAT 2 DCPLR NO-GO CPG COMPARTMENT
141	ASE	HARS ELECTRONIC UNIT NO-GO AFT AVIONICS BAY	155	ASE	PILOT LONG 1 DCPLR NO-GO PLT COMPARTMENT	169	ASE	CPG LAT 1 DCPLR NO-GO CPG COMPARTMENT
142	ASE	DASE COMPUTER NO-GO AFT AVIONICS BAY	156	ASE	PILOT COLL LVDT NO-GO PLT COMPARTMENT	170	ASE	CPG LONG 2 DCPLR NO-GO CPG COMPARTMENT
143	SPARE		157	ASE	PILOT DIR LVDT NO-GO PLT COMPARTMENT	171	ASE	CPG LONG 1 DCPLR NO-GO CPG COMPARTMENT
144	SPARE		158	ASE	PILOT LAT LVDT NO-GO PLT COMPARTMENT	172	ASE	CPG COLL LVDT NO-GO CPG COMPARTMENT
145	ASE	ROTOR BRAKE NO-GO PLT COMPARTMENT	159	ASE	PILOT LONG LVDT NO-GO PLT COMPARTMENT	173	ASE	CPG DIR LVDT NO-GO CPG COMPARTMENT
146	ASE	SQUAT SWITCH NO-GO AFT OF LH FAB	160	SPARE		174	ASE	CPG LAT LVDT NO-GO CPG COMPARTMENT
147	ASE	PILOT CYCLIC GRIP NO-GO PLT COMPARTMENT	161	ASE	TURN RATE INDICATOR NO-GO PLT COMPARTMENT	175	ASE	CPG LONG LVDT NO-GO CPG COMPARTMENT
148	ASE	PILOT COLL 2 DCPLR NO-GO PLT COMPARTMENT	162	ASE	CPG BUCS SEL NO-GO CPG COMPARTMENT			
149	ASE	PILOT COLL 1 DCPLR NO-GO PLT COMPARTMENT	163	ASE	CPG CYCLIC GRIP NO-GO CPG COMPARTMENT			

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont)

B MAINTENANCE TEST MODE (FD/LS CHECK) GOs

NOTE

Only one of following GO displays will occur at completion of FD/LS check for that system that has no fault.

Sequence	System	Message Displayed	
1	TADS	TADS GO	
2	TADS	TADS GO	FLIR NOT COOLED
3	PNVS	PNVS GO	
4	PNVS	PNVS GO	FLIR NOT COOLED
5	Air Data Sensor	AIR DATA SENSOR SYSTEM GO	
6	HARS	HARS GO	
7	Rockets	ROCKETS GO	
8	Pylons	PYLON ARTICULATION GO	
9	HME	MISSILES GO	
10	Area Weapon	GUN GO	
11	Symbol Generator	SYMBOL GENERATOR GO	
12	IHADSS	IHADSS GO	
13	Fire Control	MUX COMMUNICATION GO	

Sequence	System	Message Displayed
14	Auxiliary Power Unit	**APU** **GO**
15	Electrical	**GENERATOR SYSTEMS** **GO**
16	Automatic Stabilization	**DASE SYSTEM** **GO**
17	Stabilator	**AUTO STABILATOR SYSTEM** **GO**
18	De-ice	**DEICEING SYSTEM** **GO**
19	Utilities	**BBC-KBRD-CPG IFCP** **GO**

NOTE

Following GO display occurs only at successful completion of ETE test (no faults in any system).

20	All	**NO FAULTS DETECTED** **ALL SYSTEMS ARE GO**

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont)

C CONTINUOUS TEST MODE NO-GOs

Sequence No.	System	NO-GO Display	Sequence No.	System	NO-GO Display	Sequence No.	System	NO-GO Display
0	SPARE		14	SPARE		28	MSL	MISSILE LAUNCHER NO-GO LT OUTBD
1	ADS	AIR DATA SENSOR SYSTEM NO-GO	15	GUN	RNDS CNTR-MAG CONTROLLER NO-GO	29	MSL	MISSILE LAUNCHER NO-GO LT INBD
2	ADS	AIR DATA SENSOR SYSTEM NO-GO	16	HARS	HARS NO-GO	30	MSL	MISSILE LAUNCHER NO-GO RT INBD
3	SPARE		17	IHDS	IHADSS NO-GO	31	MSL	MISSILE LAUNCHER NO-GO RT OUTBD
4	DICE	CANOPY TEMP CONTROLLER NO-GO	18	SPARE		32	MSL	MISSILE 4 NO-GO RT OUTBD
5	DICE	CANOPY TEMP SENSOR NO-GO	19	SPARE		33	MSL	MISSILE 3 NO-GO RT OUTBD
6	DICE	TAIL ROTOR HEATER NO-GO	20	SPARE		34	MSL	MISSILE 2 NO-GO RT OUTBD
7	DICE	MAIN ROTOR HEATER NO-GO	21	SPARE		35	MSL	MISSILE 1 NO-GO RT OUTBD
8	DICE	RTR BLADE DISTR DE-ICE NO-GO	22	SPARE		36	MSL	MISSILE 4 NO-GO RT INBD
9	DICE	RTR BLADE PWR CONTROLLER NO-GO	23	SPARE		37	MSL	MISSILE 3 NO-GO RT INBD
10	DICE	ICE DET SIGN PROCESSOR NO-GO	24	SPARE		38	MSL	MISSILE 2 NO-GO RT INBD
11	DICE	ICE DETECTOR CONTROLLER NO-GO	25	SPARE		39	MSL	MISSILE 1 NO-GO RT INBD
12	DICE	ICE DETECTOR SENSOR NO-GO	26	IHDS	IHADSS DISPLAYS NO-GO	40	MSL	MISSILE 4 NO-GO LT INBD
13	GUN	GUN NO-GO	27	MSL	MISSILE NO-GO	41	MSL	MISSILE 3 NO-GO LT INBD

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont) 1-4-7

C CONTINUOUS TEST MODE NO-GOs (cont)

Sequence No.	System	NO-GO Display
42	MSL	MISSILE 2 NO-GO LT INBD
43	MSL	MISSILE 1 NO-GO LT INBD
44	MSL	MISSILE 4 NO-GO LT OUTBD
45	MSL	MISSILE 3 NO-GO LT OUTBD
46	MSL	MISSILE 2 NO-GO LT OUTBD
47	MSL	MISSILE 1 NO-GO LT OUTBD
48	MUX	MUX COMMUNICATION NO-GO CPG COMPARTMENT
49	MUX	MUX COMMUNICATION NO-GO LH FAB
50	MUX	MUX COMMUNICATION NO-GO RH FAB
51	MUX	MUX COMMUNICATION NO-GO AFT AVIONICS BAY
52	MUX	MUX COMMUNICATION NO-GO LT OUTBD
53	MUX	MUX COMMUNICATION NO-GO LT INBD
54	MUX	MUX COMMUNICATION NO-GO RT INBD
55	MUX	MUX COMMUNICATION NO-GO RT OUTBD
56	SPARE	
57	MUX	EXCESSIVE MSG ERRORS-MUX NO-GO
58	PNVS	PNVS NO-GO
59	PNVS	PNVS SERVO MODULE NO-GO
60	PNVS	PNVS VIDEO NO-GO
61	SPARE	
62	SPARE	
63	EXST	PYLON ARTICULATION NO-GO
64	EXST	PYLON ARTICULATION NO-GO RT OUTBD
65	EXST	PYLON ARTICULATION NO-GO RT INBD
66	EXST	PYLON ARTICULATION NO-GO LT INBD
67	EXST	PYLON ARTICULATION NO-GO LT OUTBD
68	RKT	ROCKETS NO-GO
69	RKT	ROCKETS NO-GO LT OUTBD
70	RKT	ROCKETS NO-GO LT INBD
71	RKT	ROCKETS NO-GO RT INBD
72	RKT	ROCKETS NO-GO RT OUTBD
73	STAB	AUTO STABILATOR SYSTEM NO-GO
74	SPARE	
75	SPARE	
76	SPARE	
77	SPARE	
78	SPARE	
79	SPARE	
80	SPARE	
81	SYGN	SYMBOL GENERATOR NO-GO
82	TADS	AND NO-GO
83	TADS	TADS ECS NO-GO

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont)

C CONTINUOUS TEST MODE NO-GOs (cont)

Sequence No.	System	NO-GO Display
84	TADS	TADS NO-GO
85	SPARE	
86	TADS	TADS LASER TRACKER NO-GO
87	SPARE	
88	TADS	TADS-LRF-D NO-GO
89	TADS	TADS IAT NO-GO
90	SPARE	
91	TADS	ORT COLUMN ASSY NO-GO
92	TADS	TADS TV NO-GO
93	TADS	TADS FLIR NO-GO
94	TADS	TADS SERVO SYSTEM NO-GO
95	SPARE	
	thru	
104	SPARE	
105	GUN	GUN BORESIGHT NO-GO
106	EXST	PYLON BORESIGHT NO-GO
107	TADS	TADS BORESIGHT NO-GO
108	PNVS	PNVS BORESIGHT NO-GO
109	UTIL	BACKUP BUS CONTROLLER NO-GO
110	UTIL	CPG FIRE CONTROL PANEL NO-GO
111	UTIL	DATA ENTRY KEYBOARD NO-GO
112	SPARE	
	thru	
127	SPARE	
128	ASE	DASE SYSTEM NO-GO
129	SPARE	
	thru	
175	SPARE	

D TEST IN PROGRESS MESSAGES

Display

DASE SYSTEM
TEST IN PROGRESS

APU
TEST IN PROGRESS

HARS
TEST IN PROGRESS

IHADSS
TEST IN PROGRESS

MISSILES
TEST IN PROGRESS

ROCKETS
TEST IN PROGRESS

AUTO STABILATOR SYSTEM
TEST IN PROGRESS

GUN
TEST IN PROGRESS

DE-ICE SYSTEM
TEST IN PROGRESS

E PROMPT AND ADVISORY MESSAGES

Display

ETE COMPLETE

ANY KEY FOR FDLS MENUS

PUT CANOPY HEATER SWITCH
IN ON POSITION
ACK VIA KBD

PUT CANOPY HEATER SWITCH
TO DESIRED POSITION
ACK VIA KBD

PLACE ROTOR BREAK SWITCH
TO BRAKE POSITION
ACK VIA KBD

CENTER ALL CONTROLS AND
ENGAGE FORCE TRIM
ACK VIA KBD

1-4-7. FD/LS DISPLAYS - COMPLETE LISTING (cont)

E PROMPT AND ADVISORY MESSAGES (cont)

Display

```
CHECK FOR FREE CYCLIC PEDAL
AND COLLECTIVE MOVEMENT
          ANSWER Y-N VIA KBD

CANNOT RUN WHILE IN AIR
ENTER B FOR BRST MENUS
ENTER F FOR FDLS MENUS

PERFORM CORRECT ACTION

ENGAGE PITCH AND ROLL
SWITCHES ON ASE PANEL
          ACK VIA KBD

BUCS ON C+W LIGHT ON
ASE AND BUCS FAIL C+W
LIGHTS OFF
          ANSWER Y-N VIA KBD

ENGAGE ALL DASE PNL SWS
CYCLE BUCS S-T SW TO PLT
CPG CENTER POSITION
          ACK VIA KBD

-PLT-TOGGLE FORCE TRIM
SW TO OFF ON MOM REL
PRESS ASE RELEASE SWITCH
          ACK VIA KBD

ARE ASE AND BUC FAIL C+W
LIGHTS ON AND BUCS ON
C+W LIGHT OFF
          ANSWER Y-N VIA KBD
```

Display

```
ENGAGE ALL DASE PNL SWS
-CPG-PULL BUCS LVDT SEL
TRIGGER PRESS TRIM+ASE
RELEASE SWS ACK VIA KBD

IS TURN RATE INDICATOR
ON VDU APPROX HALF
SCALE RIGHT
          ANSWER Y-N VIA KBD

ENGAGE PITCH ASE SWITCH
          ACK VIA KBD

PLACE ROTOR BRAKE SWITCH
TO DESIRED POSITION
          ACK VIA KBD

PUT HARS POWER SWITCH
IN NORM POSITION--WAIT--
ALLOW 90 SECONDS FOR
HARS WARM-UP

PUT PNVS POWER SWITCH
IN ON POSITION

PLT SAFE LIGHT MUST BE
ON BEFORE PROCEEDING

CPG SAFE LIGHT MUST BE
ON BEFORE PROCEEDING

PUT MSL MODE SWITCH
IN STBY POSITION

PUT CPG MSL SWITCH
IN ON POSITION

PUT TADS POWER SWITCH
IN TADS POSITION
```

Display

PUT LASER POWER SWITCH
IN ON POSITION

PUT IHADSS POWER SWITCH
IN ON POSITION

PUT GEN 1 SWITCH
IN TEST POSITION

PUT GEN 2 SWITCH
IN TEST POSITION

PUSH COLL TO FULL DOWN
SLEW STAB TO DOWN LIMIT

HOLD COLL AT FULL UP--
ACK VIA KBD

SLEW STAB TO UP LIMIT
THEN DEPRESS RESET
ACK VIA KBD

MOVE APU START SWITCH
TO START THEN RELEASE

NOSE GEARBOX + XMSN DATA

NGB1	XMN1	XMN2	NGB2
LB	LB	LB	LB
C	C	C	C

F KEYBOARD ENTRY MENU ADDRESSES

Display

01-ADS	05-HARS	09-PNVS	
02-DASE	06-IHDS	10-PYLN	FDLS MENU
03-DICE	07-MSL	11-RKT	
04-GUN	08-MUX	12-STAB	

13-SYMG	17-APU	
14-TADS	18-GEN	FDLS MENU
15-UTIL	19-TRAN	
16-ETE		

TADS	AL-20	VF-21	ED-22	
GUN	AL-23	VF-24	ED-25	BORESIGHT MENU
PYLN	AL-26	VF-27	ED-28	
PNVS	AL-29	VF-30	ED-31	

1-5-1. LRU TROUBLESHOOTING - OFF HELICOPTER

A Troubleshooting LRUs Off Helicopter.

- Troubleshooting beyond the scope of this volume for LRUs with built-in test equipment is done with Electronic Equipment Test Facility (EETF) QQ-290(V)2/MSM (TM 11-6625-3085-12).

B EETF Testable Helicopter LRUs.

- Following are listed all the helicopter system LRUs which are covered in this manual and on which off helicopter troubleshooting is accomplished using the EETF.
- The LRUs are listed by chapter, system and name of unit for which on helicopter troubleshooting is performed in this volume.

Chapter	System	LRU Name
8	Instruments	Signal Data Converter
		Engine Oil Pressure Indicator, Pilot
		NG (Gas Turbine RPM Indicator, Pilot
		Turbine Gas Temperature (TGT) Indicator, Pilot
		Engine Torque Indicator, Pilot and CPG
		Engine Rotor (ENG-RTR) RPM Indicator, Pilot and CPG
		Fuel Indicator, Pilot
		Selectable Digital Display (CPG)
9	Electrical	Generator Control Unit No. 1
		Generator Control Unit No. 2
		Transformer/Rectifier No. 1
		Transformer/Rectifier No. 2
		Battery Charger
		Engine Out/Rotor RPM/Stabilator Warning Box
		Caution/Warning Panel, Pilot
		Caution/Warning Panel, CPG
		Master Caution/Warning Panel, Pilot
		Master Caution/Warning Panel, CPG
		Multichannel Dimmer Controller
		Anticollision Light Power Supply
		External Power Monitor
11	Flight Controls	DASE Computer
		Stabilator Control No. 1
		Stabilator Control No. 2
		Pitch Stick LVDT, Pilot
		Pitch Stick LVDT, CPG
		Roll Stick LVDT, Pilot
		Roll Stick LVDT, CPG
		Yaw Pedal LVDT, Pilot
		Yaw Pedal LVDT, CPG
		Collective LVDT, Pilot
		Collective LVDT, CPG
12	Utility	Rotor Blade De-Ice Control
		Ice Detector Signal Processor
		Control, Windshield Anti-Ice (Heater Control)
		Pilot Anti-ice Panel
16	Mission Equipment	External Stores Control Box
		Pylon Actuator Control No. 1, No. 2, No. 3, No. 4

CHAPTER 2. AIRFRAME SYSTEM

AIRFRAME SYSTEM TROUBLESHOOTING IS
PERFORMED DURING INSPECTIONS.

THESE ARE

SPECIAL INSTRUCTIONS - TM 55-1520-238-23
10 HOUR/14 DAY INSPECTION CHECKLIST - TM 55-1520-238-PMS
PHASED MAINTENANCE INSTRUCTIONS - TM 55-1520-238-PM

CHAPTER 3. LANDING GEAR SYSTEM

CHAPTER OVERVIEW

Chapter 3 contains the operational checks and fault isolation procedures required for troubleshooting the landing gear system.

Landing gear system maintenance information is in TM 55-1520-238-23.

Chapter 3 is divided into the following sections:

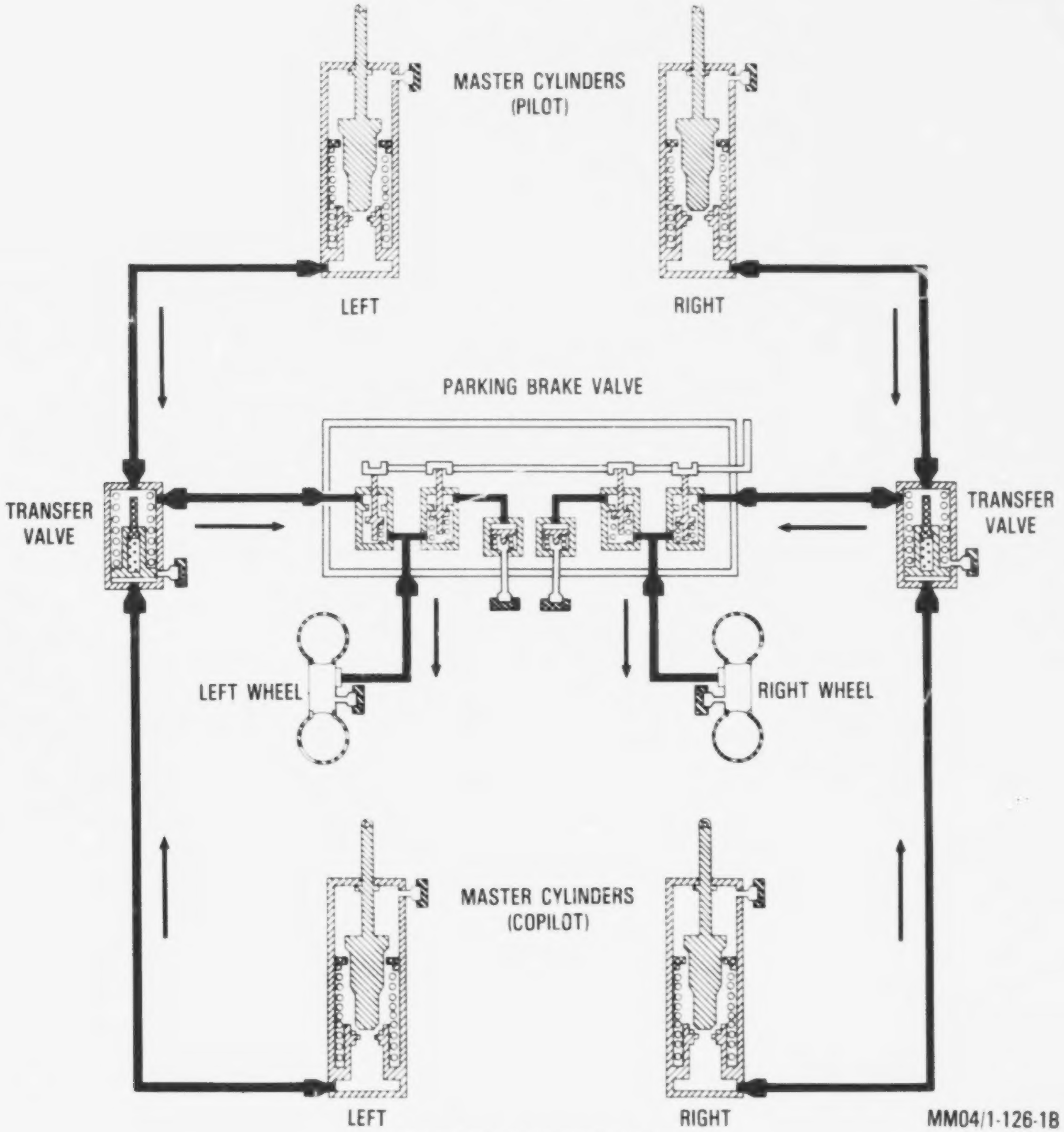
Section	Para	Title
I	3-1-1	Landing Gear System - Failure Symptom List
II	3-2-1	Main Landing Gear - Operational Check
III	3-3-1	Tail Landing Gear - Operational Check

3-1-1. LANDING GEAR SYSTEM - FAILURE SYMPTOM LIST

Symptom	Go to Para
A. Main Landing Gear Operational Check:	
1. Left or right main wheel assembly does not rotate freely, helicopter veers (swerves) in that direction.	3-2-1
2. Pilot brakes - are not firm.	3-2-1
3. Parking brake handle - retracts when brakes are set to park (brakes do not set).	3-2-1
4. Parking brake handle - does not retract (parking brake does not release).	3-2-1
5. CPG brakes - are not firm.	3-2-1
6. Tire wear is uneven (main landing gear).	3-2-1

Symptom	Go to Para
B. Tail Landing Gear Operational Check:	
1. Tail wheel lock actuator fuse pin - does not engage locking plate or does not disengage from locking plate.	3-3-1
2. Tail wheel does not return to centerline.	3-3-1

3-1-2. MAIN LANDING GEAR BRAKE SCHEMATIC DIAGRAM


MASTER CYLINDERS
(PILOT)
LEFT
RIGHT
PARKING BRAKE VALVE
TRANSFER
VALVE
TRANSFER
VALVE
LEFT WHEEL
RIGHT WHEEL
MASTER CYLINDERS
(COPILOT)
LEFT
RIGHT
MM04/1-126-1B

MAIN LANDING GEAR BRAKE SYSTEM

3-2-1. MAIN LANDING GEAR - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Jack, Hydraulic Axle, 5-Ton (2)	1730-00-540-2343

Personnel Required:

67R10 Attack Helicopter Repairer
One person to assist

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23-1	Helicopter safed

A. Perform inspection of the main landing gear system (TM 55-1520-238-23).

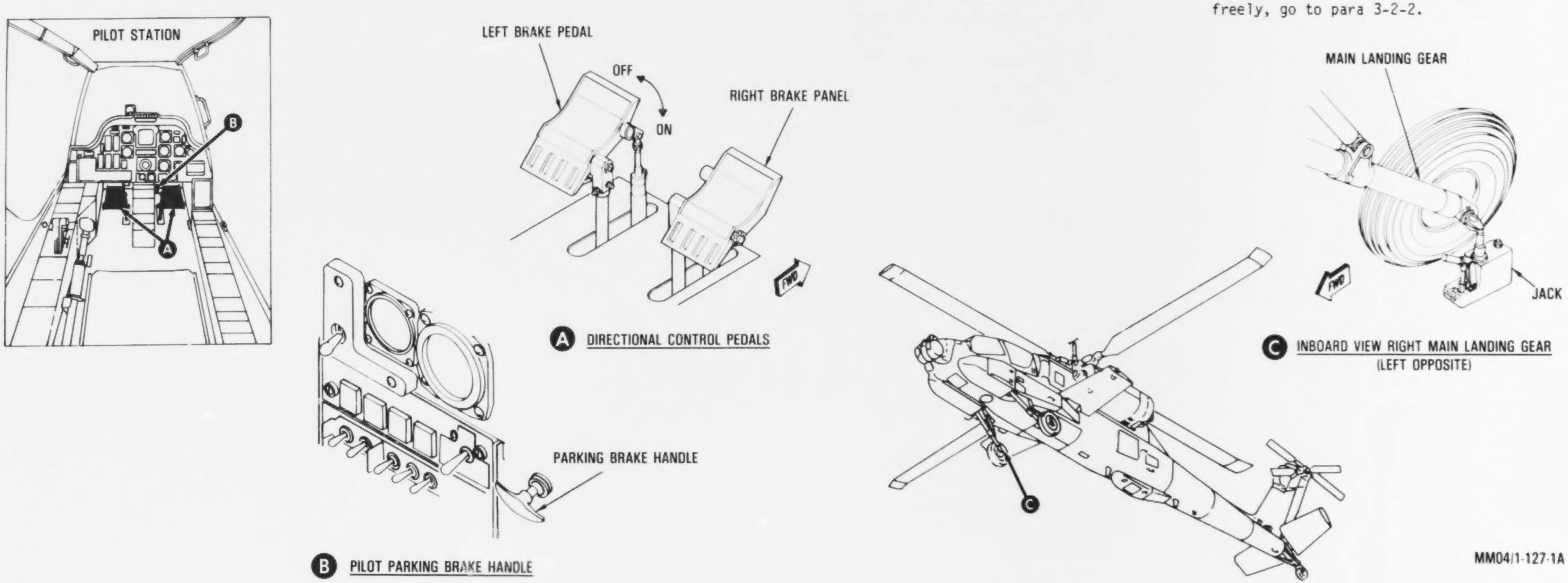
B. Check main landing gear tires for proper pressure (Main Landing Gear Tire Servicing, TM 55-1520-238-23).

C. At pilot station, release parking brakes by applying and then releasing toe pressure on top portion of directional control pedals.

D. Jack left and right main landing gear at trailing arm jack pads (TM 55-1520-238-23).

E. Complete operational check as follows:

TASK	RESULT
1. Rotate left main wheel.	If left main wheel does not rotate freely, go to para 3-2-2.



A DIRECTIONAL CONTROL PEDALS

B PILOT PARKING BRAKE HANDLE

C INBOARD VIEW RIGHT MAIN LANDING GEAR (LEFT OPPOSITE)

MM04/1-127-1A

GO TO NEXT PAGE

3-2-1. MAIN LANDING GEAR - OPERATIONAL CHECK (cont)

TASK	RESULT
2. Check left main wheel for looseness.	If left main wheel is loose, check for loose axle nut or worn bearings (TM 55-1520-238-23).
3. Rotate right main wheel.	If right main wheel does not rotate freely, go to para 3-2-2.
4. Check right main wheel for looseness.	If right main wheel is loose, check for loose axle nut or worn bearing (TM 55-1520-238-23).
5. Apply and maintain pressure on pilot left brake pedal.	If pilot left brake is not firm, go to para 3-2-3.
6. Apply and maintain pressure on pilot right brake pedal.	If pilot right brake is not firm, go to para 3-2-3.
7. Check right main wheel for rotation.	If right main wheel rotates, go to para 3-2-3.
8. Set parking brake by pressing pilot brake pedals, pulling parking handle and releasing pedals. Check that parking brake handle does not automatically retract.	If parking brake handle retracts, go to para 3-2-4.
9. Release parking brake by pressing pilot brake pedals. Check that parking brake handle retracts.	If parking brake handle does not retract, go to para 3-2-5.
10. Apply and maintain pressure on CPG right brake pedal.	If CPG right brake is not firm, go to para 3-2-6.
11. Release CPG right brake pedal.	If right wheel does not rotate freely, go to para 3-2-2.
12. Apply and maintain pressure on CPG left brake pedal.	If left brake is not firm, go to para 3-2-6.
13. Check left main wheel for rotation.	If left main wheel rotates, go to para 3-2-6.
14. Release CPG left brake pedal.	If left wheel does not rotate freely, go to para 3-2-2.

TASK	RESULT
15. Set parking brake using CPG brake pedals and parking brake handle (at pilot station). Observe that parking brake handle does not retract.	If parking brake handle retracts, go to para 3-2-3.
16. At CPG station, release parking brake by pressing CPG brake pedals. Observe that parking brake handle (at pilot station) retracts.	If parking brake handle does not retract, go to para 3-2-5.
17. Check left main wheel for freedom of rotation.	If left main wheel does not rotate, go to para 3-2-2.
18. Check main wheel tires for uneven tire wear.	If uneven tire wear exists, go to go to para 3-2-7.

F. Lower wheels slowly until jacks can be removed (TM 55-1520-238-23).

G. Remove jacks.

H. Set parking brake by applying toe pressure on top portion of directional control pedals and then pull parking brake handle. Release toe pressure on control pedals before releasing parking brake handle.

END OF TASK

3-2-2. LEFT OR RIGHT MAIN WHEEL ASSEMBLY - DOES NOT ROTATE FREELY, HELICOPTER VEERS (SWERVES) IN THAT DIRECTION

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Jack, Hydraulic Axle, 5-Ton (2)	1730-00-540-2343

Personnel Required:

67R10 Attack Helicopter Repairer

References:

TM 55-1520-238-23

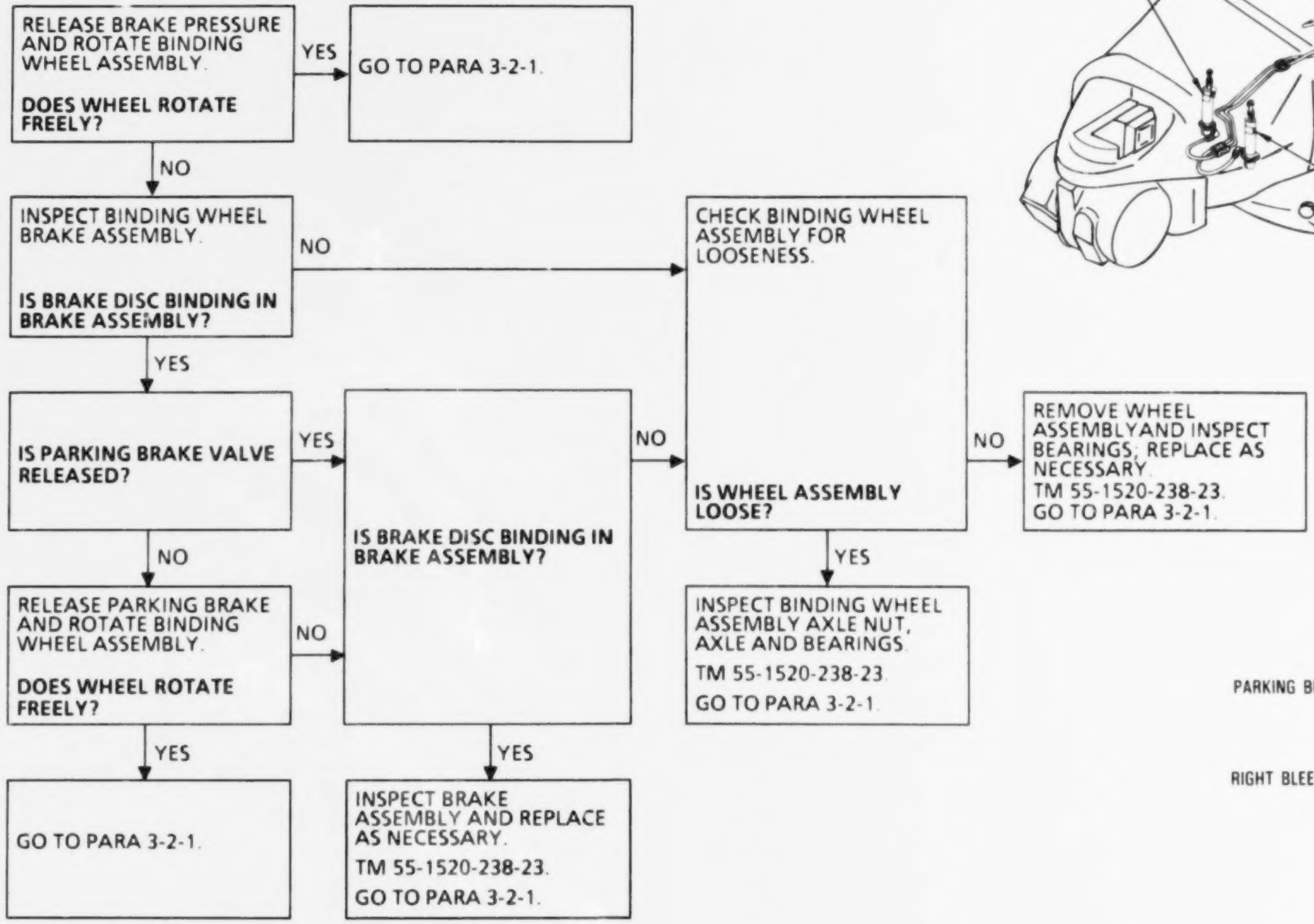
WARNING

Brake fluid may be pressurized. To avoid possible eye injury, wear face shield.

NOTE

Veering to the left may be caused by either grabbing of the left brake or by complete free wheeling of the right wheel.

Veering to the right may be caused by either grabbing of the right brake or by complete free wheeling of the left wheel.



RELEASE BRAKE PRESSURE AND ROTATE BINDING WHEEL ASSEMBLY. **DOES WHEEL ROTATE FREELY?**

GO TO PARA 3-2-1.

INSPECT BINDING WHEEL BRAKE ASSEMBLY. **IS BRAKE DISC BINDING IN BRAKE ASSEMBLY?**

CHECK BINDING WHEEL ASSEMBLY FOR LOOSENESS. **IS WHEEL ASSEMBLY LOOSE?**

IS PARKING BRAKE VALVE RELEASED?

IS BRAKE DISC BINDING IN BRAKE ASSEMBLY?

REMOVE WHEEL ASSEMBLY AND INSPECT BEARINGS, REPLACE AS NECESSARY. TM 55-1520-238-23. GO TO PARA 3-2-1.

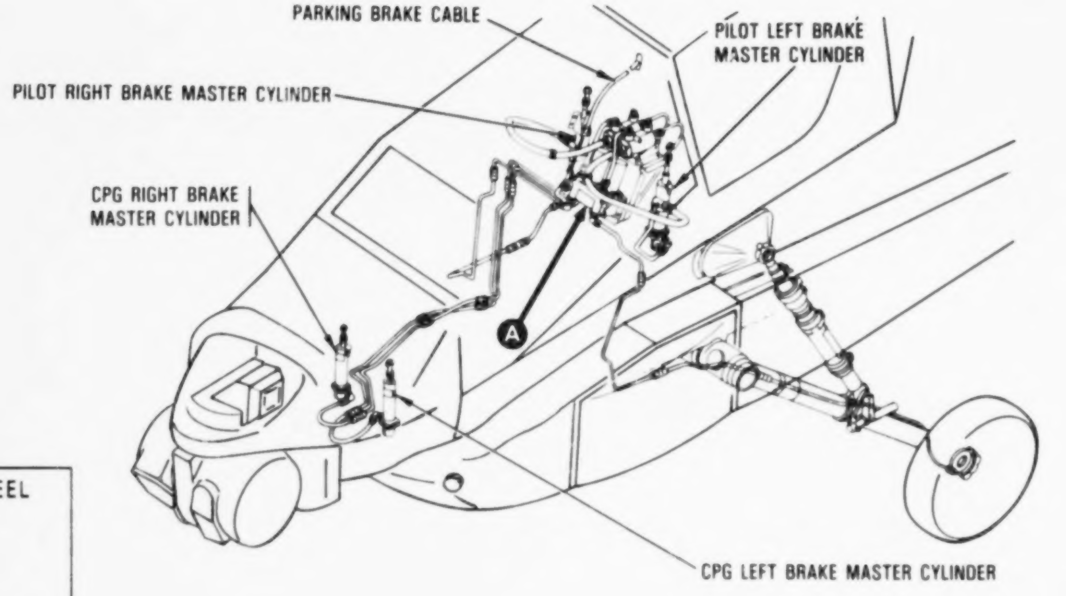
RELEASE PARKING BRAKE AND ROTATE BINDING WHEEL ASSEMBLY. **DOES WHEEL ROTATE FREELY?**

INSPECT BINDING WHEEL ASSEMBLY AXLE NUT, AXLE AND BEARINGS. TM 55-1520-238-23. GO TO PARA 3-2-1.

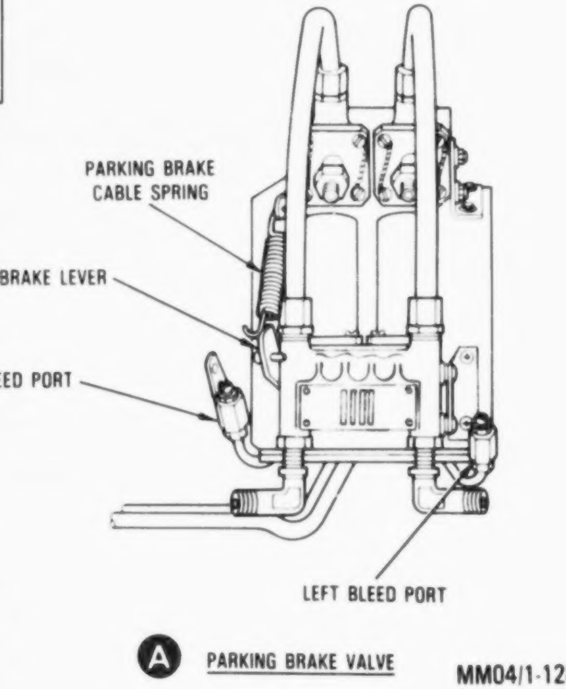
GO TO PARA 3-2-1.

INSPECT BRAKE ASSEMBLY AND REPLACE AS NECESSARY. TM 55-1520-238-23. GO TO PARA 3-2-1.

YES
NO
NO
YES
YES
NO
NO
YES
NO
NO
YES
YES



PARKING BRAKE CABLE
PILOT LEFT BRAKE MASTER CYLINDER
PILOT RIGHT BRAKE MASTER CYLINDER
CPG RIGHT BRAKE MASTER CYLINDER
A
CPG LEFT BRAKE MASTER CYLINDER



PARKING BRAKE CABLE SPRING
PARKING BRAKE LEVER
RIGHT BLEED PORT
LEFT BLEED PORT
A PARKING BRAKE VALVE

MM04/1-128-1A

END OF TASK

3-2-3. PILOT BRAKES - ARE NOT FIRM

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Jack, Hydraulic Axle, 5-Ton (2)	1730-00-540-2343

Personnel Required:

67R10 Attack Helicopter Repairer
One person to assist

References:

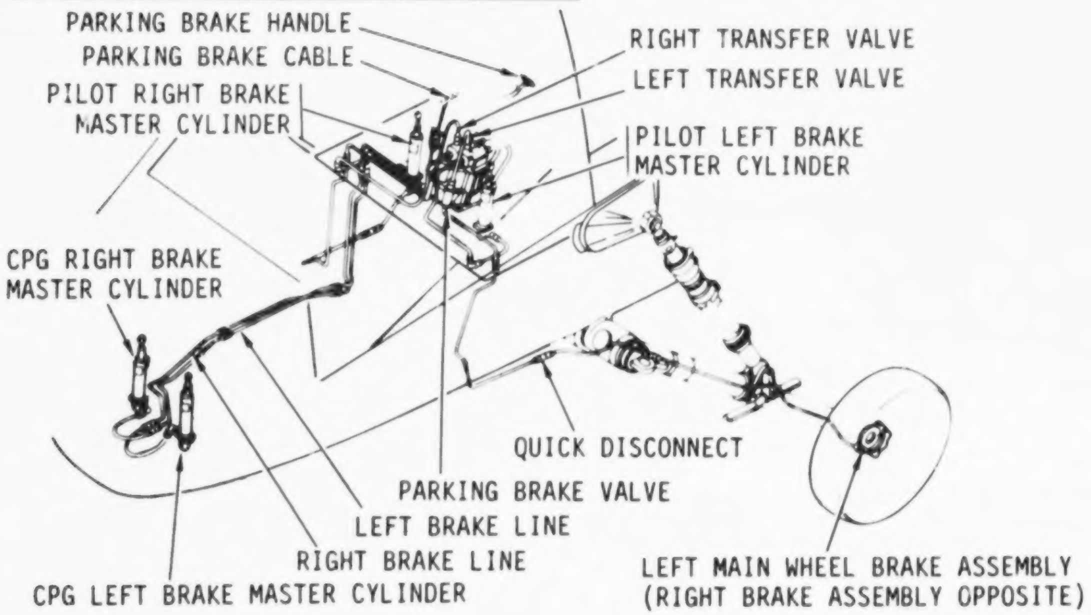
TM 55-1520-238-23

Equipment Condition:

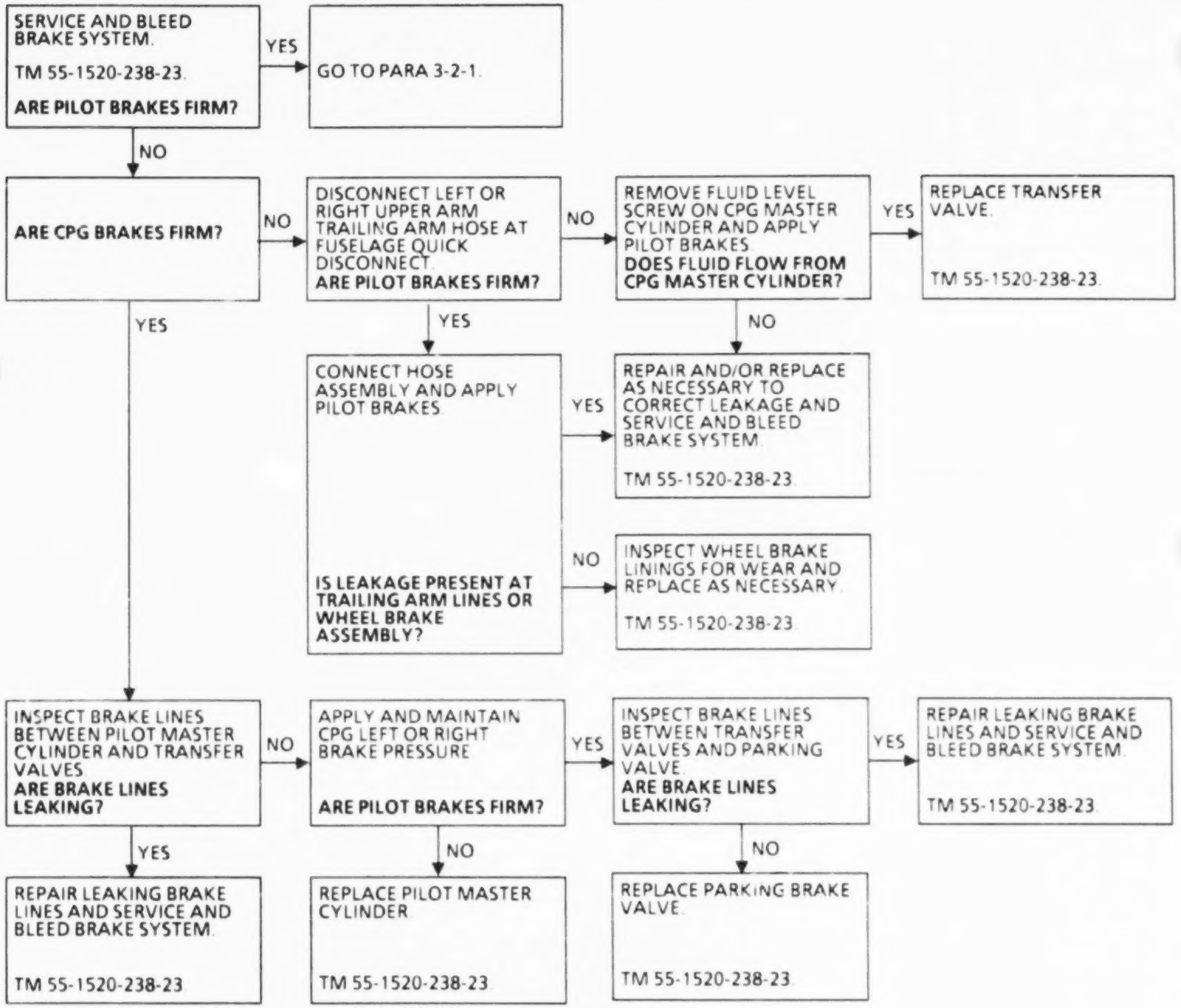
Ref	Condition
TM 55-1520-238-23	Helicopter safed

NOTE

Ensure that parking brake is released prior to proceeding.


PARKING BRAKE HANDLE
PARKING BRAKE CABLE
PILOT RIGHT BRAKE MASTER CYLINDER
RIGHT TRANSFER VALVE
LEFT TRANSFER VALVE
PILOT LEFT BRAKE MASTER CYLINDER
CPG RIGHT BRAKE MASTER CYLINDER
QUICK DISCONNECT
PARKING BRAKE VALVE
LEFT BRAKE LINE
RIGHT BRAKE LINE
CPG LEFT BRAKE MASTER CYLINDER
LEFT MAIN WHEEL BRAKE ASSEMBLY (RIGHT BRAKE ASSEMBLY OPPOSITE)

MM04/1-130D


SERVICE AND BLEED BRAKE SYSTEM. TM 55-1520-238-23. ARE PILOT BRAKES FIRM?
YES
GO TO PARA 3-2-1.
NO
ARE CPG BRAKES FIRM?
NO
DISCONNECT LEFT OR RIGHT UPPER ARM TRAILING ARM HOSE AT FUSELAGE QUICK DISCONNECT. ARE PILOT BRAKES FIRM?
NO
REMOVE FLUID LEVEL SCREW ON CPG MASTER CYLINDER AND APPLY PILOT BRAKES. DOES FLUID FLOW FROM CPG MASTER CYLINDER?
YES
REPLACE TRANSFER VALVE. TM 55-1520-238-23.
YES
NO
YES
CONNECT HOSE ASSEMBLY AND APPLY PILOT BRAKES. IS LEAKAGE PRESENT AT TRAILING ARM LINES OR WHEEL BRAKE ASSEMBLY?
YES
REPAIR AND/OR REPLACE AS NECESSARY TO CORRECT LEAKAGE AND SERVICE AND BLEED BRAKE SYSTEM. TM 55-1520-238-23.
NO
INSPECT WHEEL BRAKE LININGS FOR WEAR AND REPLACE AS NECESSARY. TM 55-1520-238-23.
INSPECT BRAKE LINES BETWEEN PILOT MASTER CYLINDER AND TRANSFER VALVES. ARE BRAKE LINES LEAKING?
NO
APPLY AND MAINTAIN CPG LEFT OR RIGHT BRAKE PRESSURE. ARE PILOT BRAKES FIRM?
YES
INSPECT BRAKE LINES BETWEEN TRANSFER VALVES AND PARKING VALVE. ARE BRAKE LINES LEAKING?
YES
REPAIR LEAKING BRAKE LINES AND SERVICE AND BLEED BRAKE SYSTEM. TM 55-1520-238-23.
YES
REPAIR LEAKING BRAKE LINES AND SERVICE AND BLEED BRAKE SYSTEM. TM 55-1520-238-23.
NO
REPLACE PILOT MASTER CYLINDER. TM 55-1520-238-23.
NO
REPLACE PARKING BRAKE VALVE. TM 55-1520-238-23.

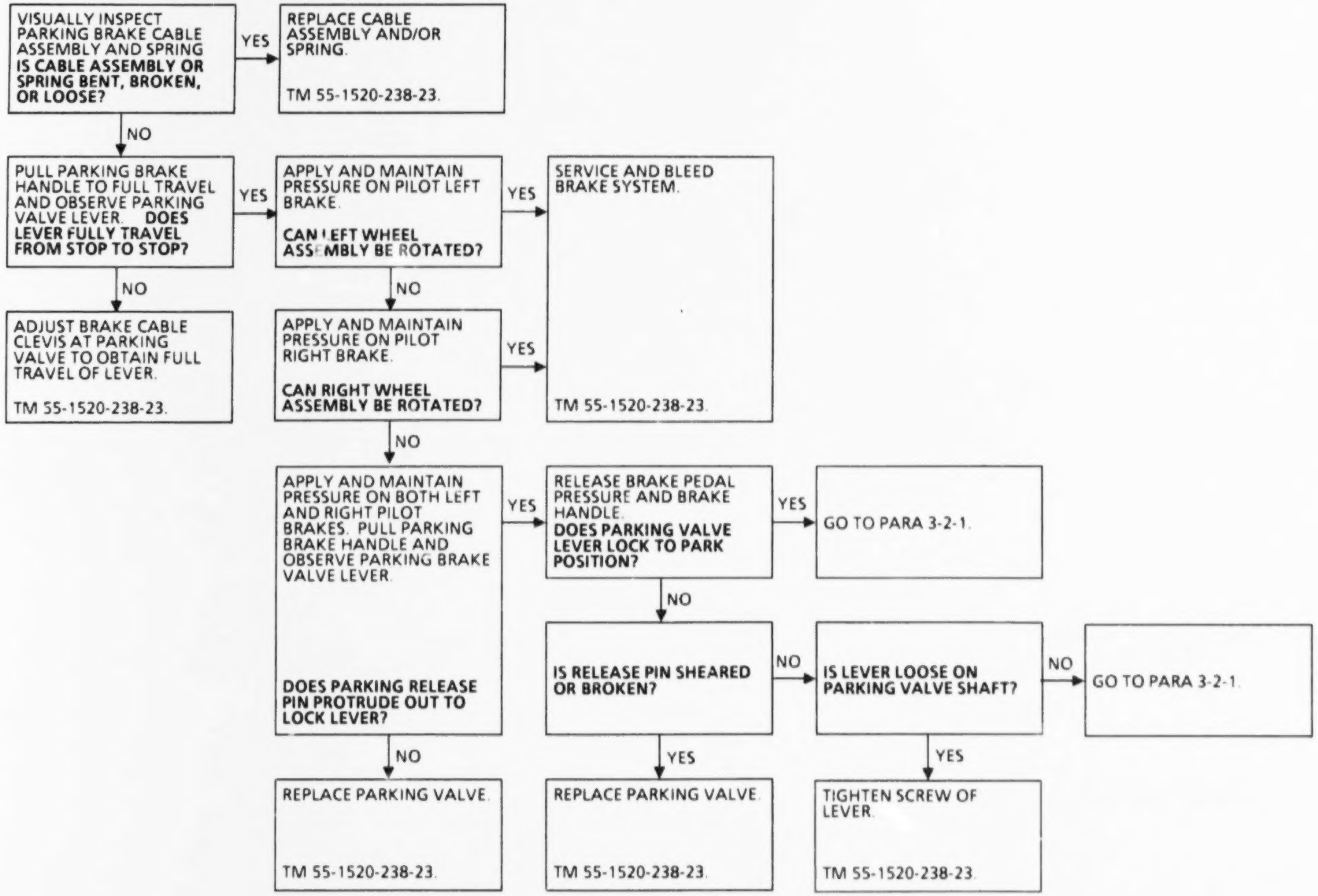
END OF TASK

3-2-4. PARKING BRAKE HANDLE - RETRACTS WHEN BRAKES ARE SET TO PARK (BRAKES DO NOT SET)

Tools: (para 3-2-3)

Personnel Required: (para 3-2-3)

References: (para 3-2-3)



VISUALLY INSPECT PARKING BRAKE CABLE ASSEMBLY AND SPRING **IS CABLE ASSEMBLY OR SPRING BENT, BROKEN, OR LOOSE?**

REPLACE CABLE ASSEMBLY AND/OR SPRING. TM 55-1520-238-23.

PULL PARKING BRAKE HANDLE TO FULL TRAVEL AND OBSERVE PARKING VALVE LEVER. **DOES LEVER FULLY TRAVEL FROM STOP TO STOP?**

APPLY AND MAINTAIN PRESSURE ON PILOT LEFT BRAKE. **CAN LEFT WHEEL ASSEMBLY BE ROTATED?**

SERVICE AND BLEED BRAKE SYSTEM. TM 55-1520-238-23.

ADJUST BRAKE CABLE CLEVIS AT PARKING VALVE TO OBTAIN FULL TRAVEL OF LEVER. TM 55-1520-238-23.

APPLY AND MAINTAIN PRESSURE ON PILOT RIGHT BRAKE. **CAN RIGHT WHEEL ASSEMBLY BE ROTATED?**

APPLY AND MAINTAIN PRESSURE ON BOTH LEFT AND RIGHT PILOT BRAKES. PULL PARKING BRAKE HANDLE AND OBSERVE PARKING BRAKE VALVE LEVER. **DOES PARKING RELEASE PIN PROTRUDE OUT TO LOCK LEVER?**

RELEASE BRAKE PEDAL PRESSURE AND BRAKE HANDLE. **DOES PARKING VALVE LEVER LOCK TO PARK POSITION?**

GO TO PARA 3-2-1.

IS RELEASE PIN SHEARED OR BROKEN?

IS LEVER LOOSE ON PARKING VALVE SHAFT?

GO TO PARA 3-2-1.

REPLACE PARKING VALVE. TM 55-1520-238-23.

REPLACE PARKING VALVE. TM 55-1520-238-23.

TIGHTEN SCREW OF LEVER. TM 55-1520-238-23.

END OF TASK

3-2-5. PARKING BRAKE HANDLE - DOES NOT RETRACT (PARKING BRAKE DOES NOT RELEASE)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Jack, Hydraulic Axle, 5-Ton (2)	1730-00-540-2343

Personnel Required:

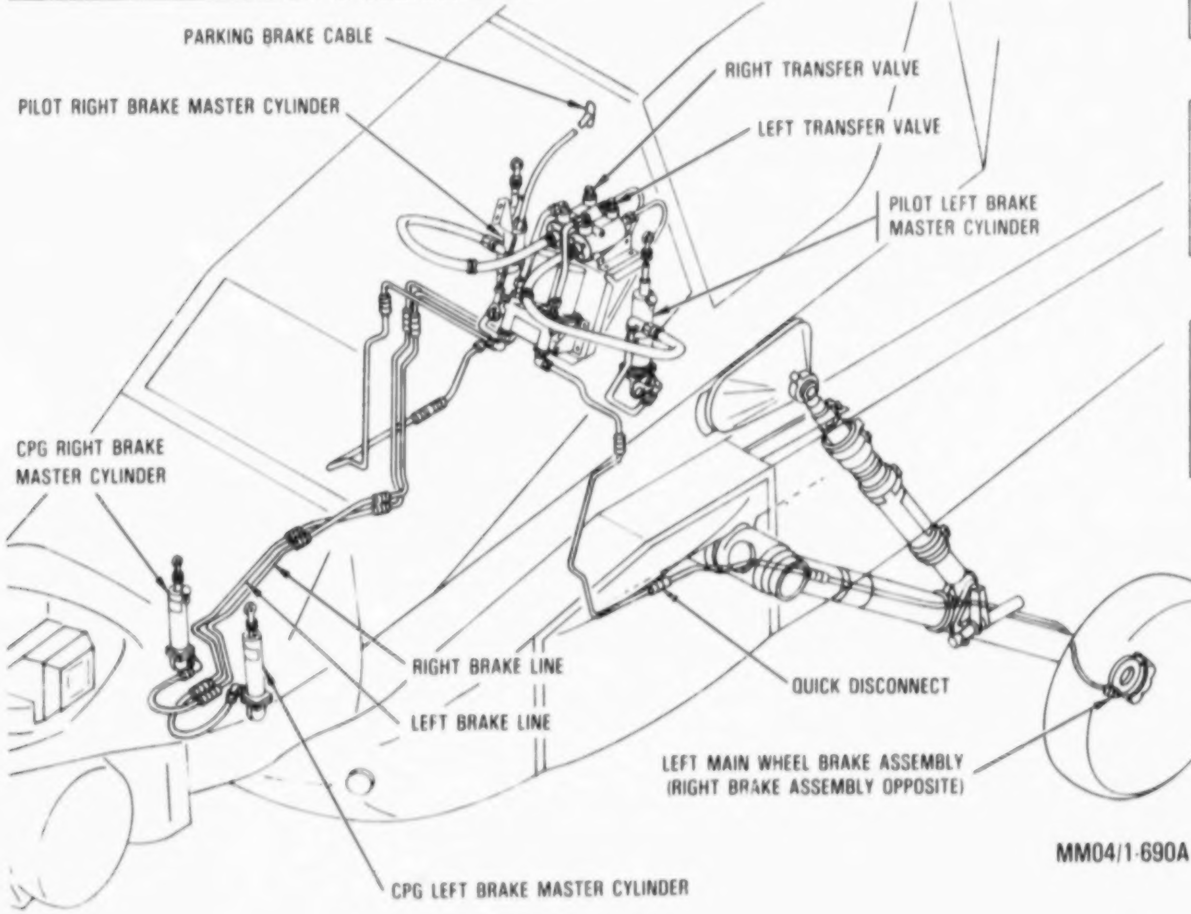
67R10 Attack Helicopter Repairer
One person to assist

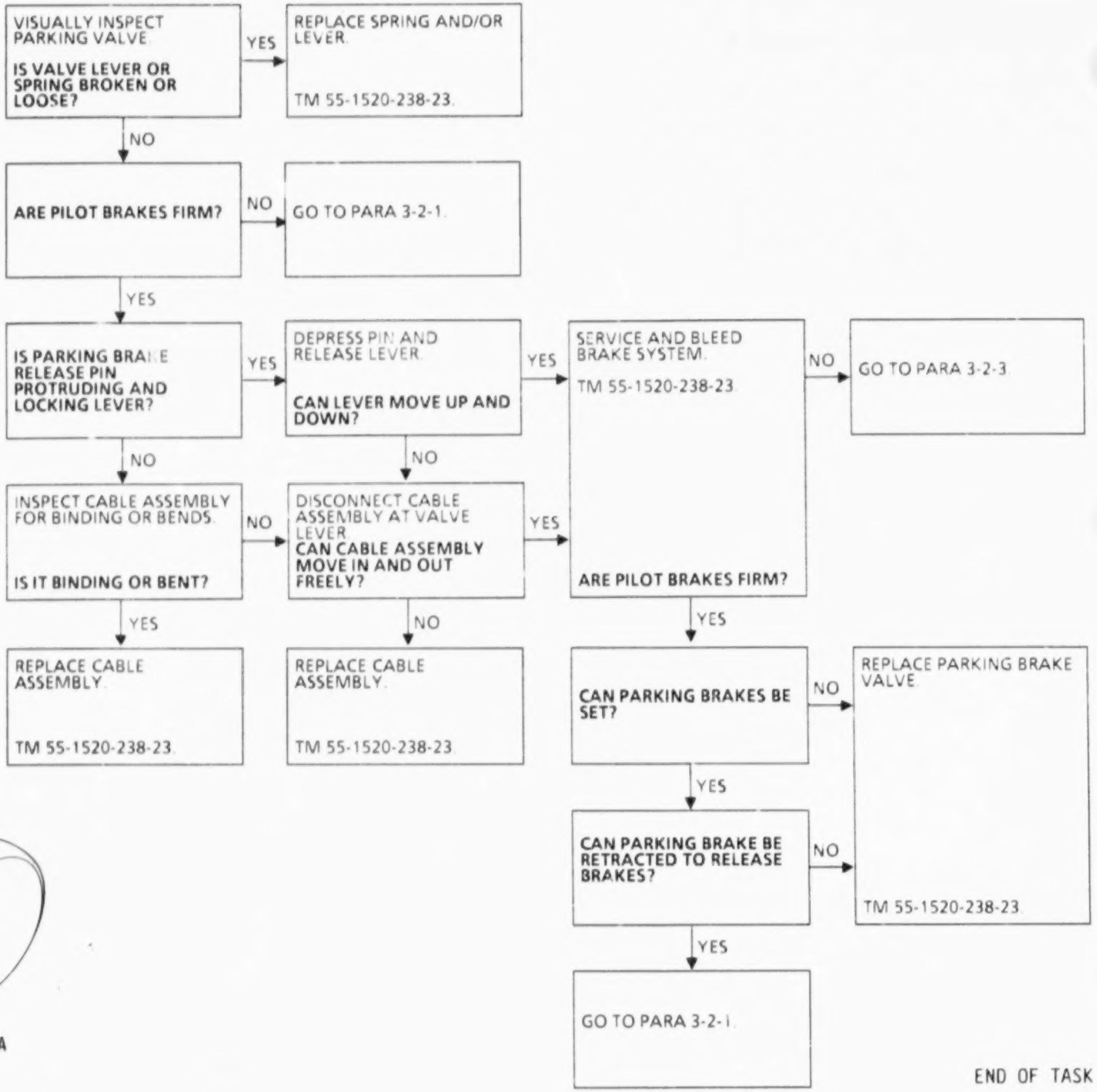
References:

TM 55-1520-238-23

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


PARKING BRAKE CABLE
PILOT RIGHT BRAKE MASTER CYLINDER
RIGHT TRANSFER VALVE
LEFT TRANSFER VALVE
PILOT LEFT BRAKE MASTER CYLINDER
CPG RIGHT BRAKE MASTER CYLINDER
RIGHT BRAKE LINE
LEFT BRAKE LINE
QUICK DISCONNECT
LEFT MAIN WHEEL BRAKE ASSEMBLY (RIGHT BRAKE ASSEMBLY OPPOSITE)
CPG LEFT BRAKE MASTER CYLINDER
MM04/1-690A


VISUALLY INSPECT PARKING VALVE.
IS VALVE LEVER OR SPRING BROKEN OR LOOSE?
YES
REPLACE SPRING AND/OR LEVER.
TM 55-1520-238-23.
NO
ARE PILOT BRAKES FIRM?
NO
GO TO PARA 3-2-1.
YES
IS PARKING BRAKE RELEASE PIN PROTRUDING AND LOCKING LEVER?
YES
DEPRESS PIN AND RELEASE LEVER.
CAN LEVER MOVE UP AND DOWN?
YES
SERVICE AND BLEED BRAKE SYSTEM.
TM 55-1520-238-23.
ARE PILOT BRAKES FIRM?
NO
GO TO PARA 3-2-3.
NO
INSPECT CABLE ASSEMBLY FOR BINDING OR BENDS.
IS IT BINDING OR BENT?
NO
NO
DISCONNECT CABLE ASSEMBLY AT VALVE LEVER.
CAN CABLE ASSEMBLY MOVE IN AND OUT FREELY?
YES
YES
REPLACE CABLE ASSEMBLY.
TM 55-1520-238-23.
NO
REPLACE CABLE ASSEMBLY.
TM 55-1520-238-23.
YES
CAN PARKING BRAKES BE SET?
NO
REPLACE PARKING BRAKE VALVE.
TM 55-1520-238-23.
YES
CAN PARKING BRAKE BE RETRACTED TO RELEASE BRAKES?
NO
YES
GO TO PARA 3-2-1.

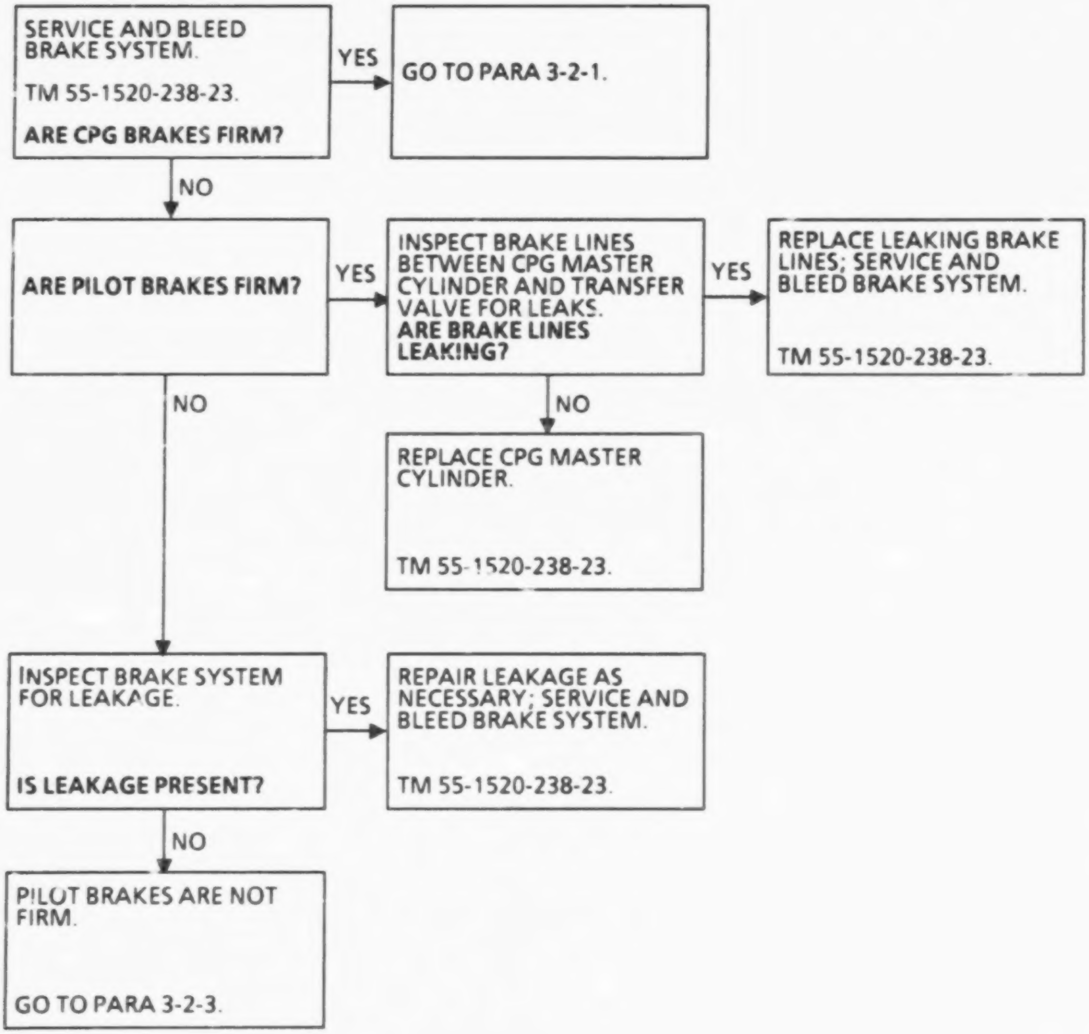
END OF TASK

3-2-6. CPG BRAKES - ARE NOT FIRM

Tools: (para 3-2-5)

Personnel Required: (para 3-2-5)

References: (para 3-2-5)


SERVICE AND BLEED BRAKE SYSTEM.
TM 55-1520-238-23.
ARE CPG BRAKES FIRM?
YES
GO TO PARA 3-2-1.
NO
ARE PILOT BRAKES FIRM?
YES
INSPECT BRAKE LINES BETWEEN CPG MASTER CYLINDER AND TRANSFER VALVE FOR LEAKS.
ARE BRAKE LINES LEAKING?
YES
REPLACE LEAKING BRAKE LINES; SERVICE AND BLEED BRAKE SYSTEM.
TM 55-1520-238-23.
NO
REPLACE CPG MASTER CYLINDER.
TM 55-1520-238-23.
NO
INSPECT BRAKE SYSTEM FOR LEAKAGE.
IS LEAKAGE PRESENT?
YES
REPAIR LEAKAGE AS NECESSARY; SERVICE AND BLEED BRAKE SYSTEM.
TM 55-1520-238-23.
NO
PILOT BRAKES ARE NOT FIRM.
GO TO PARA 3-2-3.

END OF TASK

3-2-7. TIRE WEAR - IS UNEVEN (MAIN LANDING GEAR)

Tools: (para 3-2-5)

Personnel Required:

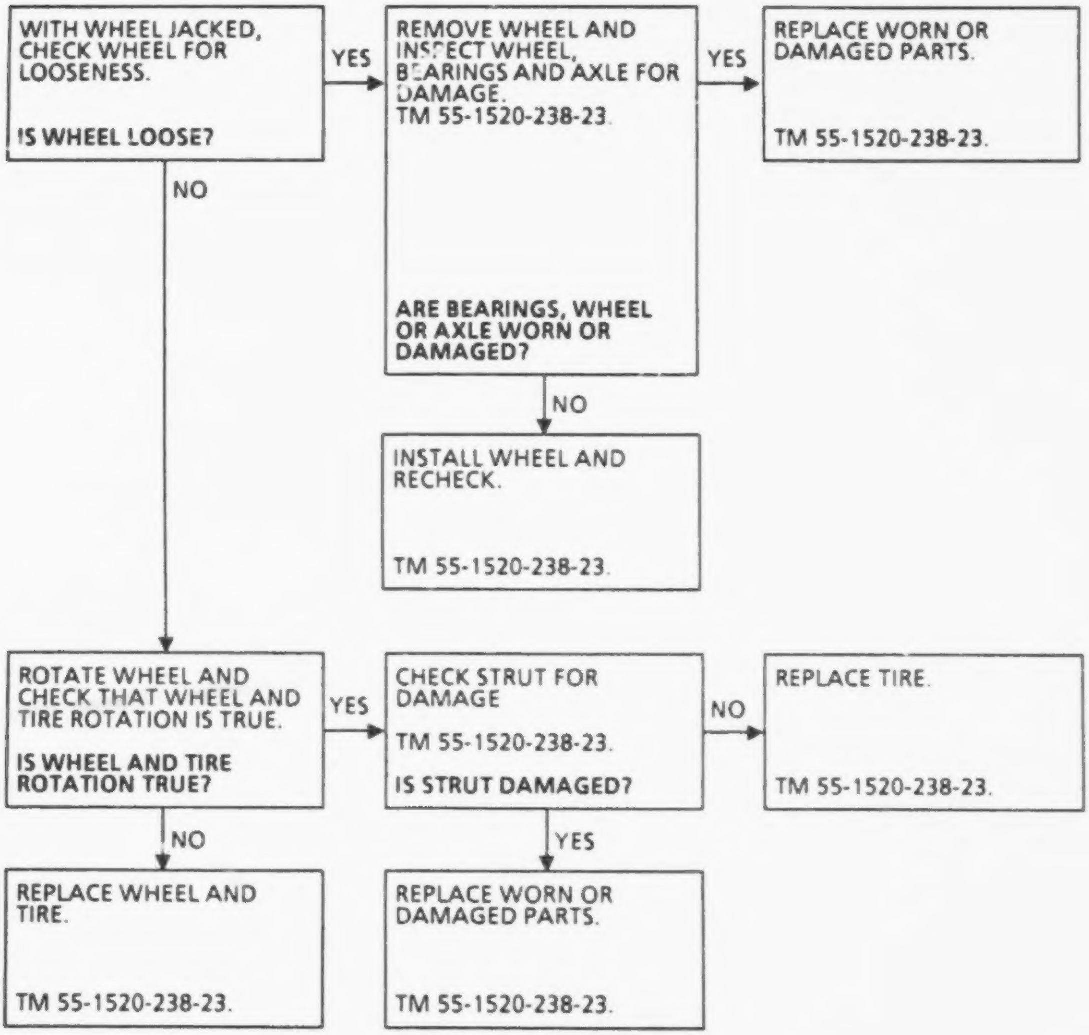
67R10 Attack Helicopter Repairer

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Left or right main landing gear wheel jacked


WITH WHEEL JACKED, CHECK WHEEL FOR LOOSENESS.
IS WHEEL LOOSE?
YES
REMOVE WHEEL AND INSPECT WHEEL, BEARINGS AND AXLE FOR DAMAGE.
TM 55-1520-238-23.
ARE BEARINGS, WHEEL OR AXLE WORN OR DAMAGED?
YES
REPLACE WORN OR DAMAGED PARTS.
TM 55-1520-238-23.
NO
INSTALL WHEEL AND RECHECK.
TM 55-1520-238-23.
NO
ROTATE WHEEL AND CHECK THAT WHEEL AND TIRE ROTATION IS TRUE.
IS WHEEL AND TIRE ROTATION TRUE?
YES
CHECK STRUT FOR DAMAGE
TM 55-1520-238-23.
IS STRUT DAMAGED?
NO
REPLACE TIRE.
TM 55-1520-238-23.
NO
REPLACE WHEEL AND TIRE.
TM 55-1520-238-23.
YES
REPLACE WORN OR DAMAGED PARTS.
TM 55-1520-238-23.

END OF TASK

3-3-1. TAIL LANDING GEAR - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Jack, Hydraulic Axle, 5-Ton	1730-00-540-2343
Ground Power Unit, Aviation (AGPU)	1730-01-144-1897

Personnel Required:

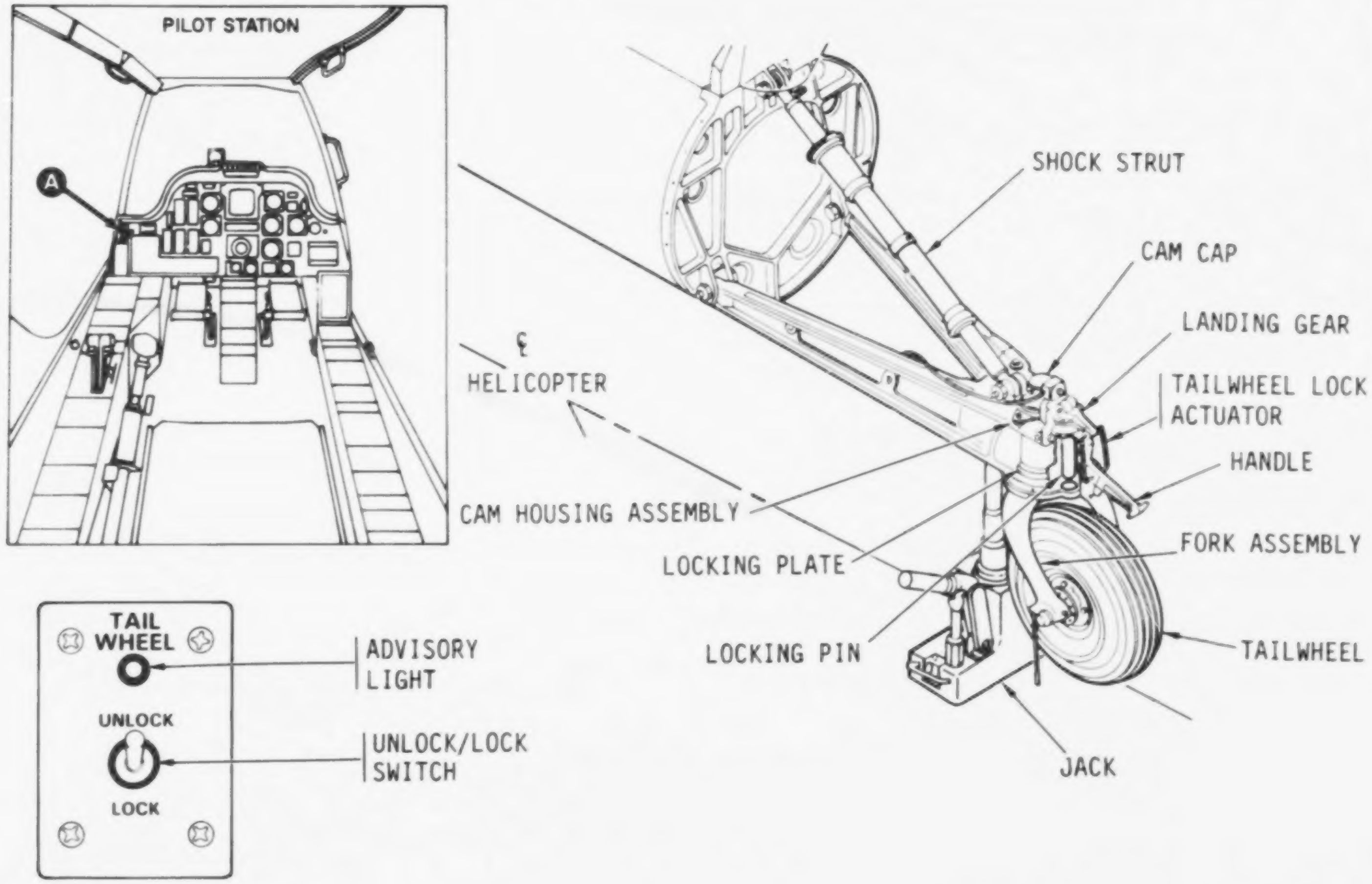
67R10 Attack Helicopter Repairer
One person to assist

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected


PILOT STATION
A
SHOCK STRUT
CAM CAP
LANDING GEAR
TAILWHEEL LOCK ACTUATOR
HANDLE
FORK ASSEMBLY
TAILWHEEL
JACK
LOCKING PIN
LOCKING PLATE
CAM HOUSING ASSEMBLY
℄ HELICOPTER
TAIL WHEEL
UNLOCK
LOCK
ADVISORY LIGHT
UNLOCK/LOCK SWITCH

Ⓐ TAIL WHEEL PANEL

MM04/1-689A

3-3-1

A. Perform inspection of the tail landing gear system (TM 55-1520-238-23).

B. Jack tail landing gear at tail landing gear pad (TM 55-1520-238-23).

C. Remove safety pin from tail wheel lock actuator (TM 55-1520-238-23).

D. Complete the operational check as follows:

TASK	RESULT
1. Use handle to unlock tail wheel locking pin.	If tail wheel locking pin is binding or does not disengage from locking plate, go to para 3-3-2.
2. Move tail wheel to either side of helicopter centerline and release.	If tail wheel does not return to centerline, go to para 3-3-3.
3. Perform external power application electrical and utility hydraulic (TM 55-1520-238-23).	
4. On pilot **TAIL WHEEL** panel, set **UNLOCK/LOCK** switch to **LOCK**. Check that tail wheel is locked.	If tail wheel is not locked, refer to chapter 7 to troubleshoot utility hydraulic system.
5. On pilot **TAIL WHEEL** panel, set **UNLOCK/LOCK** switch to **UNLOCK**. Check that tail wheel is unlocked.	If tail wheel is not unlocked, refer to hydraulic system operational check, chapter 7.
6. Check that advisory light on **TAIL WHEEL** panel is lighted when tail wheel is unlocked.	If advisory light is not lighted, refer to chapter 7 to troubleshoot utility hydraulic system (TM 55-1520-238-23).

E. Disconnect GPU from helicopter (TM 55-1520-238-23).

F. Lower tail landing gear slowly until jack can be removed (TM 55-1520-238-23).

G. Remove jack.

H. Install safety pin in tail wheel lock actuator (TM 55-1520-238-23).

END OF TASK

3-3-2. TAIL WHEEL LOCK ACTUATOR FUSE PIN - DOES NOT ENGAGE LOCKING PLATE OR DOES NOT DISENGAGE FROM LOCKING PLATE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Jack, Hydraulic Axle, 5-Ton	1730-00-540-2343

Personnel Required:

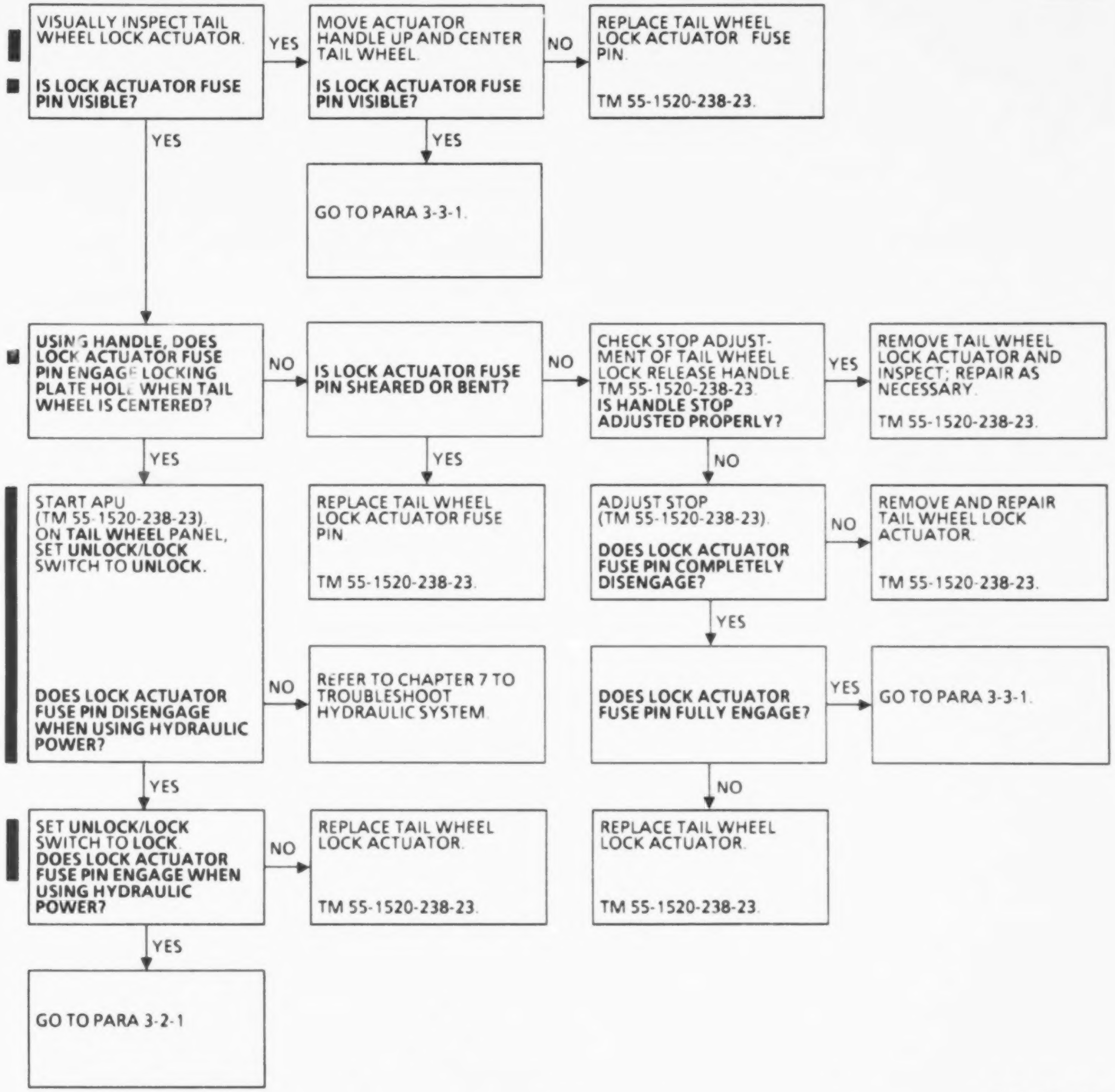
67R10 Attack Helicopter Repairer

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



VISUALLY INSPECT TAIL WHEEL LOCK ACTUATOR.
IS LOCK ACTUATOR FUSE PIN VISIBLE?

MOVE ACTUATOR HANDLE UP AND CENTER TAIL WHEEL.
IS LOCK ACTUATOR FUSE PIN VISIBLE?

REPLACE TAIL WHEEL LOCK ACTUATOR FUSE PIN.
TM 55-1520-238-23.

GO TO PARA 3-3-1.

USING HANDLE, DOES LOCK ACTUATOR FUSE PIN ENGAGE LOCKING PLATE HOLE WHEN TAIL WHEEL IS CENTERED?

IS LOCK ACTUATOR FUSE PIN SHEARED OR BENT?

CHECK STOP ADJUSTMENT OF TAIL WHEEL LOCK RELEASE HANDLE. TM 55-1520-238-23.
IS HANDLE STOP ADJUSTED PROPERLY?

REMOVE TAIL WHEEL LOCK ACTUATOR AND INSPECT; REPAIR AS NECESSARY.
TM 55-1520-238-23.

START APU (TM 55-1520-238-23) ON **TAIL WHEEL** PANEL, SET **UNLOCK/LOCK** SWITCH TO **UNLOCK**.
DOES LOCK ACTUATOR FUSE PIN DISENGAGE WHEN USING HYDRAULIC POWER?

REPLACE TAIL WHEEL LOCK ACTUATOR FUSE PIN.
TM 55-1520-238-23.

ADJUST STOP (TM 55-1520-238-23).
DOES LOCK ACTUATOR FUSE PIN COMPLETELY DISENGAGE?

REMOVE AND REPAIR TAIL WHEEL LOCK ACTUATOR.
TM 55-1520-238-23.

REFER TO CHAPTER 7 TO TROUBLESHOOT HYDRAULIC SYSTEM.

DOES LOCK ACTUATOR FUSE PIN FULLY ENGAGE?

GO TO PARA 3-3-1.

SET **UNLOCK/LOCK** SWITCH TO **LOCK**.
DOES LOCK ACTUATOR FUSE PIN ENGAGE WHEN USING HYDRAULIC POWER?

REPLACE TAIL WHEEL LOCK ACTUATOR.
TM 55-1520-238-23.

REPLACE TAIL WHEEL LOCK ACTUATOR.
TM 55-1520-238-23.

GO TO PARA 3-2-1

END OF TASK

3-3-3. TAIL WHEEL - DOES NOT RETURN TO CENTERLINE

Tools:

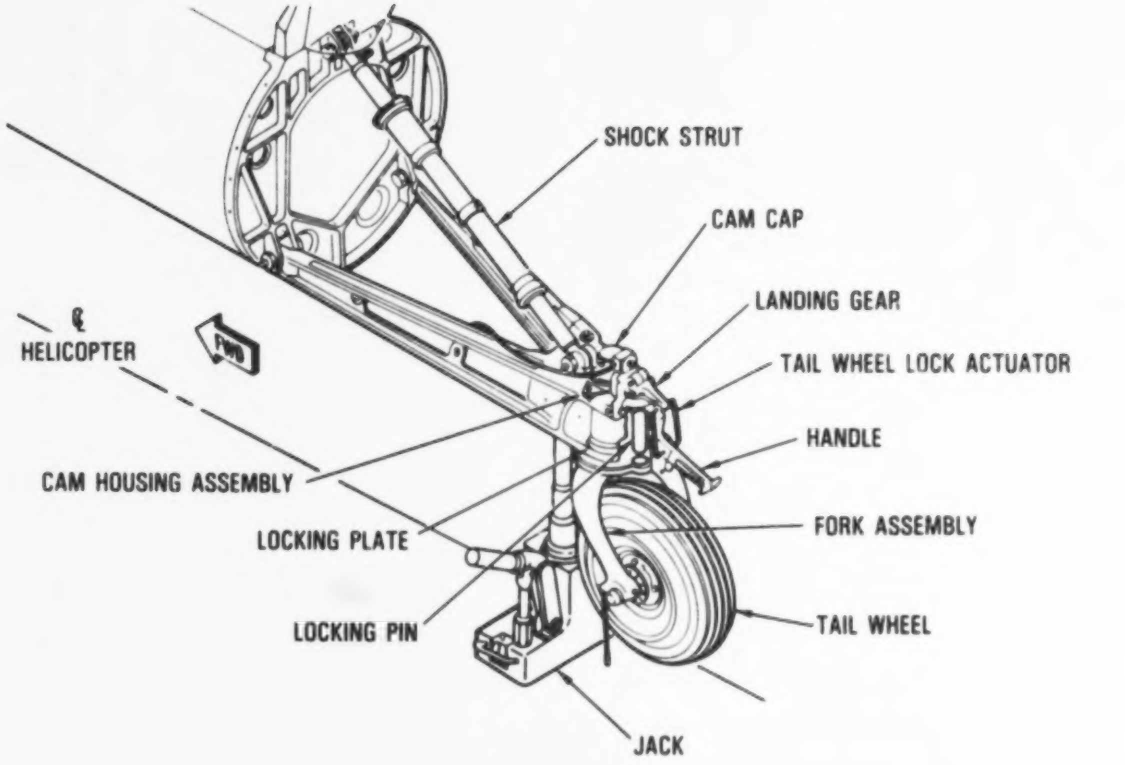
Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Jack, Hydraulic Axle, 5-Ton	1730-00-540-2343

Personnel Required:

67R10 Attack Helicopter Repairer

References:

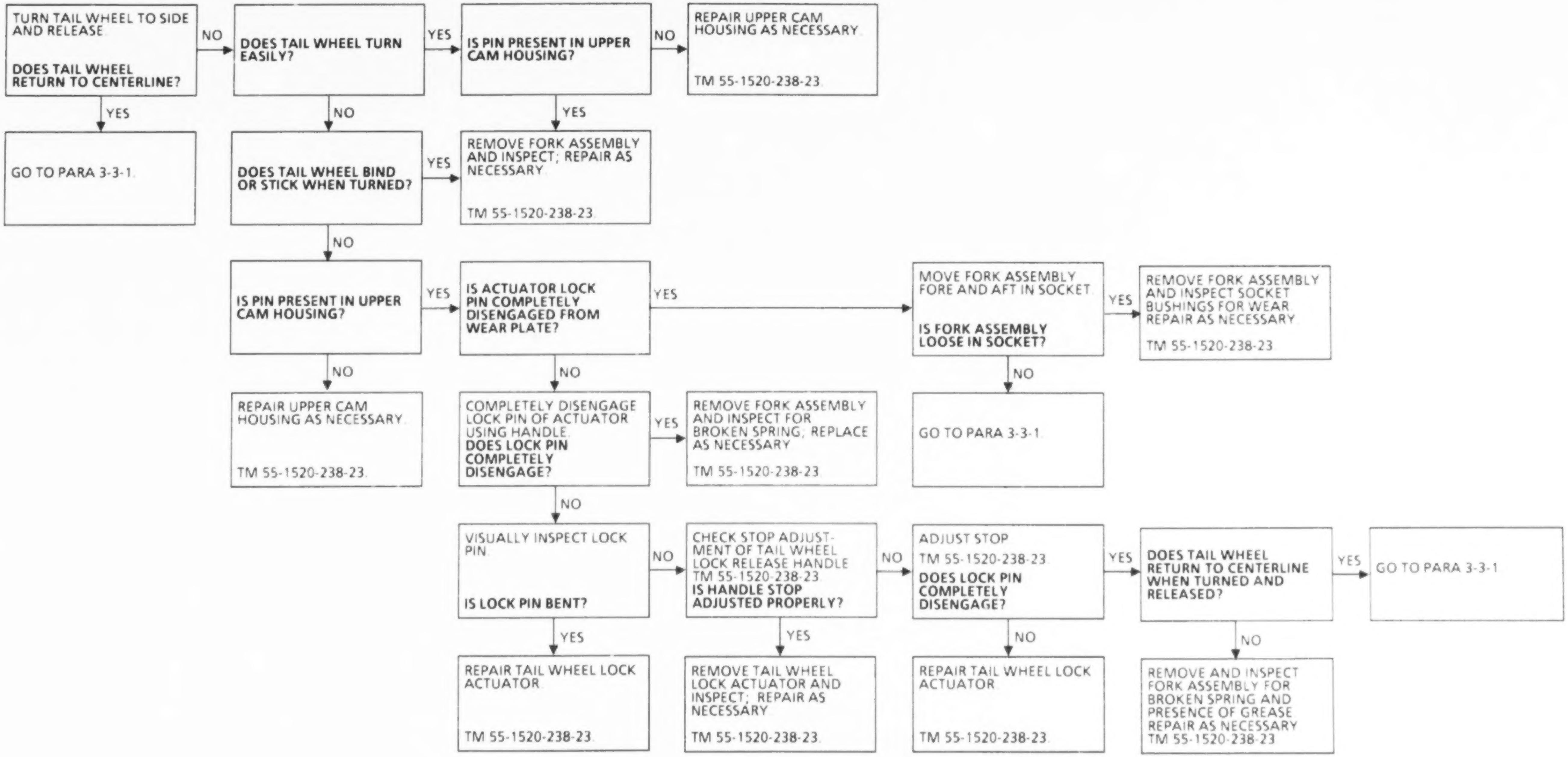
TM 55-1520-238-23


SHOCK STRUT
CAM CAP
LANDING GEAR
TAIL WHEEL LOCK ACTUATOR
HANDLE
FORK ASSEMBLY
TAIL WHEEL
JACK
LOCKING PIN
LOCKING PLATE
CAM HOUSING ASSEMBLY
℄ HELICOPTER
FWD

MM04/1-133B

GO TO NEXT PAGE

3-3-3. TAIL WHEEL - DOES NOT RETURN TO CENTERLINE (cont)


TURN TAIL WHEEL TO SIDE AND RELEASE. DOES TAIL WHEEL RETURN TO CENTERLINE?
NO
DOES TAIL WHEEL TURN EASILY?
YES
IS PIN PRESENT IN UPPER CAM HOUSING?
NO
REPAIR UPPER CAM HOUSING AS NECESSARY. TM 55-1520-238-23.
YES
GO TO PARA 3-3-1.
NO
DOES TAIL WHEEL BIND OR STICK WHEN TURNED?
YES
REMOVE FORK ASSEMBLY AND INSPECT; REPAIR AS NECESSARY. TM 55-1520-238-23.
NO
IS PIN PRESENT IN UPPER CAM HOUSING?
YES
IS ACTUATOR LOCK PIN COMPLETELY DISENGAGED FROM WEAR PLATE?
YES
MOVE FORK ASSEMBLY FORE AND AFT IN SOCKET. IS FORK ASSEMBLY LOOSE IN SOCKET?
YES
REMOVE FORK ASSEMBLY AND INSPECT SOCKET BUSHINGS FOR WEAR. REPAIR AS NECESSARY. TM 55-1520-238-23.
NO
REPAIR UPPER CAM HOUSING AS NECESSARY. TM 55-1520-238-23.
NO
COMPLETELY DISENGAGE LOCK PIN OF ACTUATOR USING HANDLE. DOES LOCK PIN COMPLETELY DISENGAGE?
YES
REMOVE FORK ASSEMBLY AND INSPECT FOR BROKEN SPRING; REPLACE AS NECESSARY. TM 55-1520-238-23.
NO
GO TO PARA 3-3-1.
NO
VISUALLY INSPECT LOCK PIN. IS LOCK PIN BENT?
NO
CHECK STOP ADJUSTMENT OF TAIL WHEEL LOCK RELEASE HANDLE TM 55-1520-238-23. IS HANDLE STOP ADJUSTED PROPERLY?
NO
ADJUST STOP TM 55-1520-238-23. DOES LOCK PIN COMPLETELY DISENGAGE?
YES
DOES TAIL WHEEL RETURN TO CENTERLINE WHEN TURNED AND RELEASED?
YES
GO TO PARA 3-3-1
YES
REPAIR TAIL WHEEL LOCK ACTUATOR. TM 55-1520-238-23.
YES
REMOVE TAIL WHEEL LOCK ACTUATOR AND INSPECT; REPAIR AS NECESSARY. TM 55-1520-238-23.
NO
REPAIR TAIL WHEEL LOCK ACTUATOR. TM 55-1520-238-23.
NO
REMOVE AND INSPECT FORK ASSEMBLY FOR BROKEN SPRING AND PRESENCE OF GREASE. REPAIR AS NECESSARY. TM 55-1520-238-23.

END OF TASK

CHAPTER 4. POWER PLANTS

CHAPTER OVERVIEW

Chapter 4 contains the operational checks and fault isolation procedures required for troubleshooting the power plants.

Power plants maintenance information is in TM 55-1520-238-23.

Chapter 4 is divided into the following sections:

Section	Para	Title
I	4-1-1	Failure Symptom List
II	4-2-1	Power Plants - Operational Check (Engine 1)
	4-2-2	Power Plants - Operational Check (Engine 2)
III	4-3-1	Torque Sharing System - Operational Check

4-1-1. POWER PLANTS SYSTEM - FAILURE SYMPTOM LIST

Symptom	Go to Para
A. Power Plants - Operational Check:	
1. Engine 1 does not accelerate to or remain between **23** and **25** percent **N_G** in **IGN OVRD**.	4-2-1
2. **ENG START** circuit breaker (CB58) - does not stay closed.	4-2-1
3. **ENG START ENG 1** indicator - is not lighted with engine 1 started.	4-2-1
4. **ENG START ENG 1** start indicator - stays lighted above **52%** **N_G**.	4-2-1
5. **ENGINE 1 OUT** indicators - are lighted with engine 1 running.	4-2-1
6. **ENGINE 1 N_G** - does not remain stable with circuit **A** closed.	4-2-1
7. **ENGINE 1 N_G** - does not remain stable with circuit **B** closed.	4-2-1
8. **ENGINE 1 N_G** - does not decrease with **CKT A** and **CKT B** closed.	4-2-1
9. **CHIPS ENG 1** indicator - is lighted.	4-2-1
10. **OIL BYP ENG 1** indicator - is lighted.	4-2-1
11. **FUEL BYP ENG 1** indicator - is lighted.	4-2-1
12. **FUEL PSI ENG 1** indicator - is lighted.	4-2-1
13. CPG engine No. 1 power lever - cannot be advanced to **LOCKOUT**.	4-2-1
14. Pilot engine chop indicator - does not light with pilot collective stick in chop.	4-2-1 or 4-2-2
15. Pilot collective stick - does not reset chop function.	4-2-1 or 4-2-2
16. CPG engine chop indicator - does not light with CPG collective stick in chop.	4-2-1 or 4-2-2
17. CPG collective stick - does not reset chop function.	4-2-1 or 4-2-2
18. Engine 2 does not accelerate to or remain between **23** and **25** percent **N_G** in **IGN OVRD**.	4-2-2
19. **ENG START** circuit breaker - does not stay closed with **ENG 2** switch in **START** position.	4-2-2
20. **ENG START ENG 2** indicator - is not lighted with engine 2 started.	4-2-2
21. **ENG START ENG 2** indicator - remains lighted above **52%** **N_G**.	4-2-2
22. **ENGINE 2 OUT** indicators - are lighted with engine 2 running.	4-2-2

Symptom	Go to Para
23. Engine **2 N_G** - does not remain stable with **CKT A** switch closed.	4-2-2
24. Engine **2 N_G** - does not remain stable with **CKT B** switch closed.	4-2-2
25. Engine **2 N_G** - does not decrease with **CKT A** and **CKT B** switches closed.	4-2-2
26. **CHIPS ENG 2** indicator - is lighted.	4-2-2
27. **OIL BYP ENG 2** indicator - is lighted.	4-2-2
28. **FUEL BYP ENG 2** indicator - is lighted.	4-2-2
29. **FUEL PSI ENG 2** indicator - is lighted.	4-2-2
30. CPG engine No. 2 power lever - cannot be advanced to **LOCKOUT**.	4-2-1
31. Engine No. 1 - does not start.	4-2-1
32. Engine No. 2 - does not start.	4-2-1
33. **OIL PSI ENG 1** indicator - is lighted with engine **OIL PSIX10** indicating more than 22.	4-2-1
34. **OIL PSI ENG 2** indicator - is lighted with engine oil **PSIX10** indicating more than **22**.	4-2-2
35. **EMERG PWR** indicator - is not lighted with **CKT B** switch set to **ENG 1**.	4-2-1
36. **EMERG PWR** indicator - is not lighted with **CKT B** switch set to **ENG 2**.	4-2-2
37. ECS airflow present with **NO. 1 ENG START** switch at **IGN OVRD**.	4-2-1
38. ECS airflow present with **NO. 2 ENG START** switch at **IGN OVRD**.	4-2-2
39. Excessive torsional vibration and **N_R** droop occurs during flight - (No. 1 engine **N_P** lags behind No. 2 **N_P** during recovery maneuver).	4-2-1
40. Excessive torsional vibration and **N_R** droop occurs during flight - (No. 2 engine **N_P** lags behind No. 1 **N_P** during recovery maneuver).	4-2-2
41. Engine 1 does not relight - **CKT A** and **CKT B** switches released.	4-2-1
42. Engine 2 does not relight - **CKT A** and **CKT B** switches released.	4-2-2
43. Pilot power quadrant panel edge-light - does not light.	4-2-2
44. CPG power quadrant panel edge-light - does not light.	4-2-2

4-1-1. POWER PLANTS SYSTEM - FAILURE SYMPTOM LIST

Symptom	Go to Para
B. Torque Sharing System - Operational Check:	
1. Engine 1 **TORQUE** indication is lower than engine 2 **TORQUE** indication (indications not within 5% of each other).	4-3-1
2. Engine 2 **TORQUE** indication is lower than engine 1 **TORQUE** indication (indications not within 5% of each other).	4-3-1

4-1-2. POWER PLANTS - POWER UP

Personnel Required:

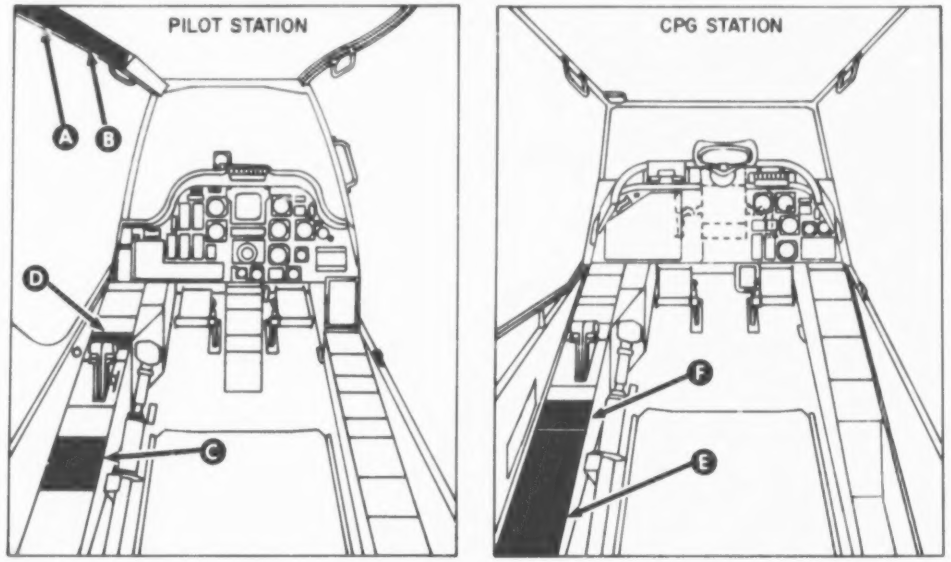
67R10 Attack Helicopter Repairer

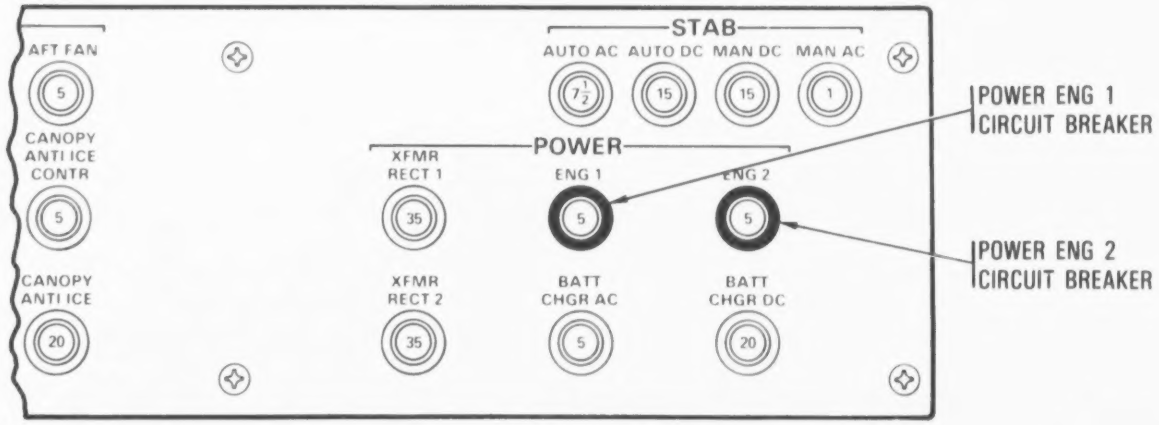
References:

TM 55-1520-238-23

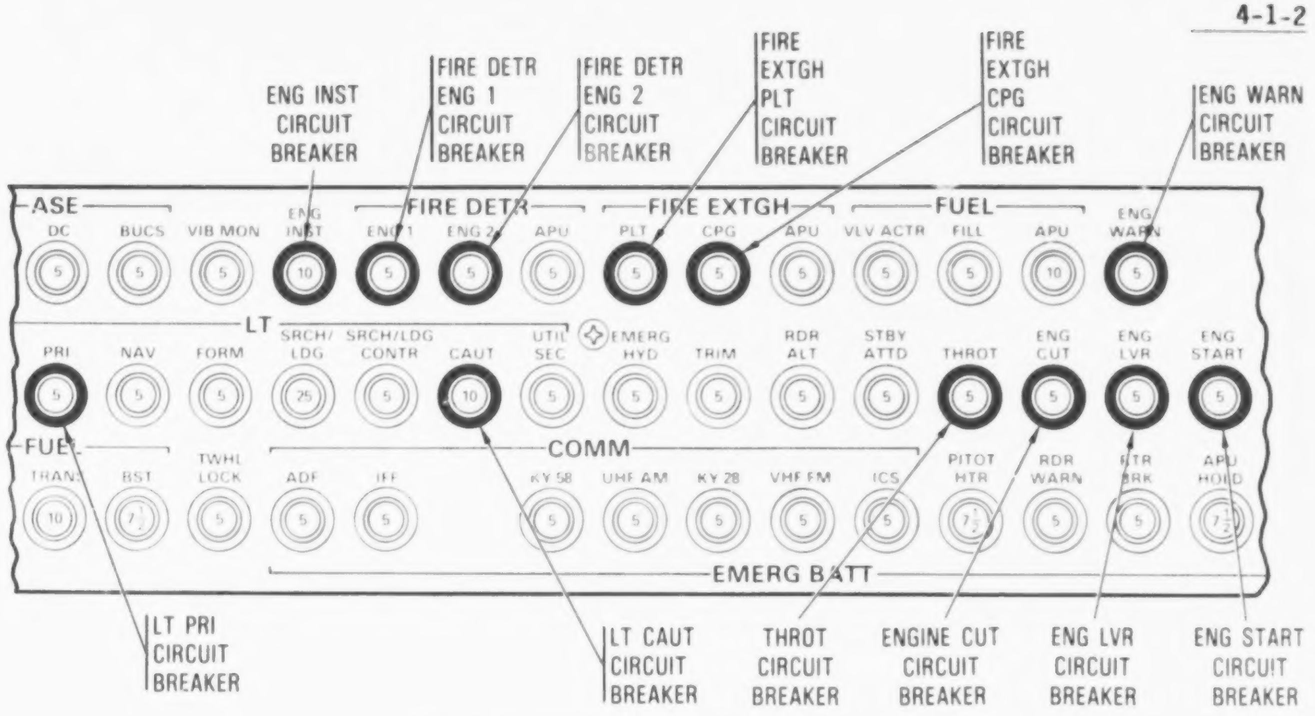
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Chapter 10	FUEL SYSTEM - POWER UP completed

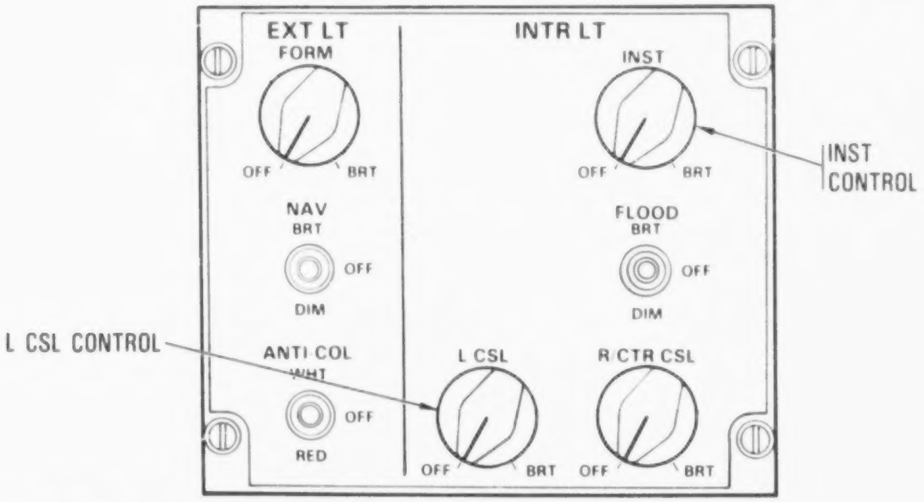

PILOT STATION
A
B
D
C
CPG STATION
F
E


AFT FAN
5
CANOPY ANTI ICE CONTR
5
CANOPY ANTI ICE
20
STAB
AUTO AC
7½
AUTO DC
15
MAN DC
15
MAN AC
1
POWER
XFMR RECT 1
35
ENG 1
5
ENG 2
5
XFMR RECT 2
35
BATT CHGR AC
5
BATT CHGR DC
20
POWER ENG 1 CIRCUIT BREAKER
POWER ENG 2 CIRCUIT BREAKER

A PILOT AFT CIRCUIT BREAKER PANEL


ENG INST CIRCUIT BREAKER
FIRE DETR ENG 1 CIRCUIT BREAKER
FIRE DETR ENG 2 CIRCUIT BREAKER
FIRE EXTGH PLT CIRCUIT BREAKER
FIRE EXTGH CPG CIRCUIT BREAKER
ENG WARN CIRCUIT BREAKER
ASE
DC
BUCS
VIB MON
ENG INST
FIRE DETR
ENG 1
ENG 2
APU
FIRE EXTGH
PLT
CPG
APU
FUEL
VLV ACTR
FILL
APU
ENG WARN
LT
PRI
NAV
FORM
SRCH/ LDG
SRCH/LDG CONTR
CAUT
UTIL SEC
EMERG HYD
TRIM
RDR ALT
STBY ATTD
THROT
ENG CUT
ENG LVR
ENG START
FUEL
TRANS
BST
TWHL LOCK
ADF
IFF
COMM
KY 58
UHF AM
KY 28
VHF FM
ICS
PITOT HTR
RDR WARN
RTR BRK
APU HOLD
EMERG BATT
LT PRI CIRCUIT BREAKER
LT CAUT CIRCUIT BREAKER
THROT CIRCUIT BREAKER
ENGINE CUT CIRCUIT BREAKER
ENG LVR CIRCUIT BREAKER
ENG START CIRCUIT BREAKER

B PILOT CENTER CIRCUIT BREAKER PANEL


EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R/CTR CSL
OFF
BRT
INST CONTROL
L CSL CONTROL

C PILOT EXT LT/INTR LT PANEL

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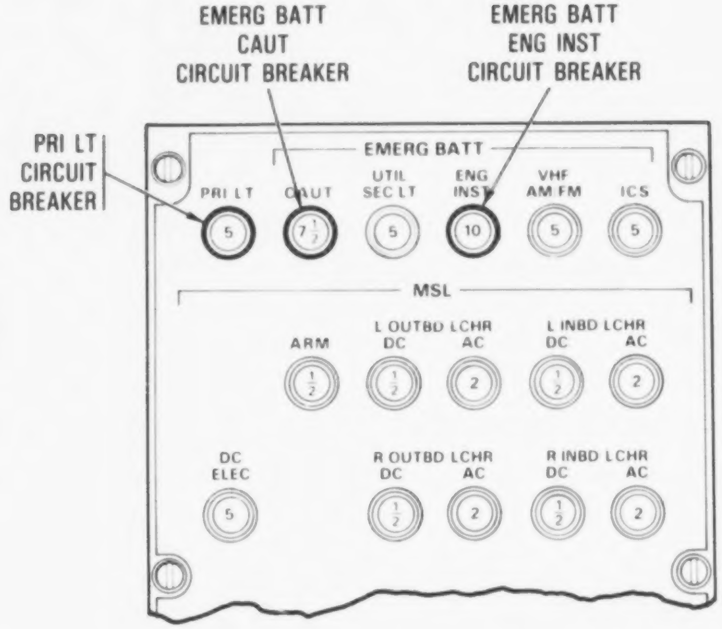
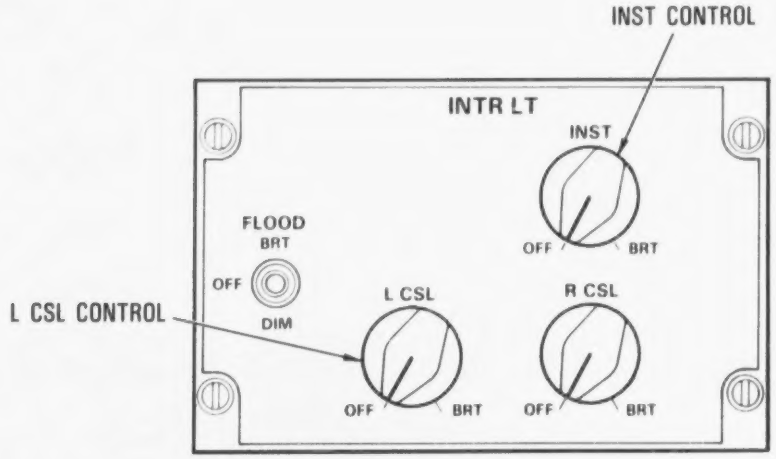
4-1-2. POWER PLANTS - POWER UP (cont)


EMERG BATT
CAUT
CIRCUIT BREAKER
EMERG BATT
ENG INST
CIRCUIT BREAKER
PRI LT
CIRCUIT
BREAKER
EMERG BATT
PRI LT
CAUT
UTIL
SEC LT
ENG
INST
VHF
AM FM
ICS
5
7 1/2
5
10
5
5
MSL
ARM
L OUTBD LCHR
DC
AC
L INBD LCHR
DC
AC
1/2
1/2
2
1/2
2
DC
ELEC
R OUTBD LCHR
DC
AC
R INBD LCHR
DC
AC
5
1/2
2
1/2
2

E CPG CIRCUIT BREAKER PANEL NO. 1


INST CONTROL
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL CONTROL
L CSL
OFF
BRT
R CSL
OFF
BRT

F CPG INTR LT PANEL

A. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **EXT PWR**.

B. On pilot aft circuit breaker panel, check that **POWER - ENG 1** and **POWER - ENG 2** circuit breakers are closed.

C. On pilot center circuit breaker panel, check that the following circuit breakers are closed:

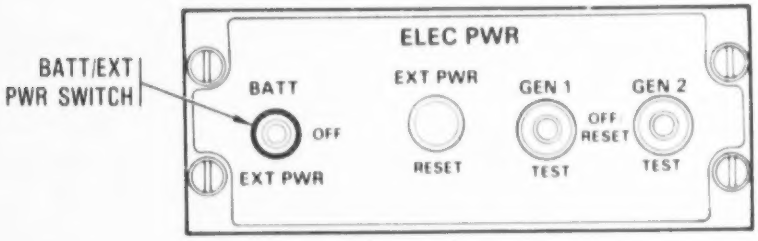
ENG INST
ENG WARN
THROT
FIRE DETR - ENG 1
FIRE DETR - ENG 2
ENG CUT
FIRE EXTGH - PLT
FIRE EXTGH - CPG
ENG LVR
LT - PRI
LT - CAUT
ENG START

D. On CPG circuit breaker panel No. 1, check that the following circuit breakers are closed:

PRI LT
EMERG BATT CAUT
EMERG BATT ENG INST

E. On pilot and CPG **INTR LT** panel, set **L CSL** controls to **BRT**.

F. On pilot and CPG **INTR LT** panels, set **INST** controls to **BRT**.


BATT/EXT
PWR SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
TEST
OFF
RESET
GEN 2
TEST

Ⓓ PILOT ELEC PWR PANEL

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END OF TASK

4-1-3. POWER PLANTS - POWER DOWN

Personnel Required:

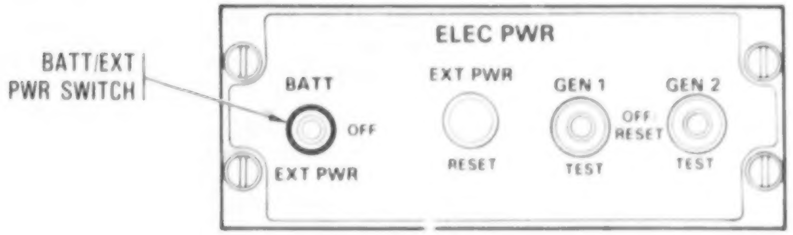
67R10 Attack Helicopter Repairer

References:

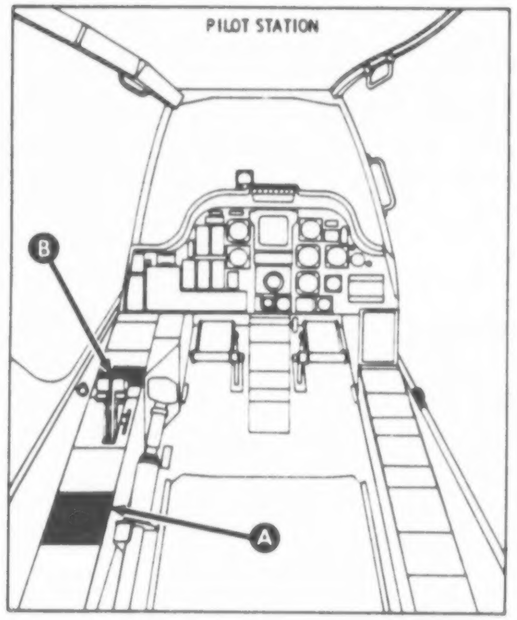
TM 55-1520-238-23

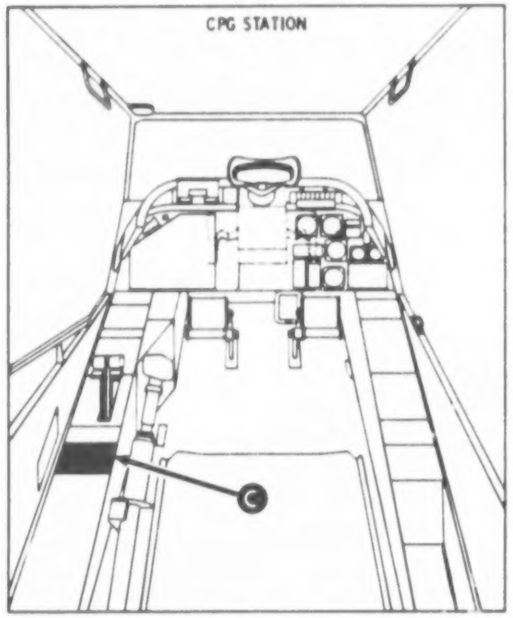
Equipment Conditions:

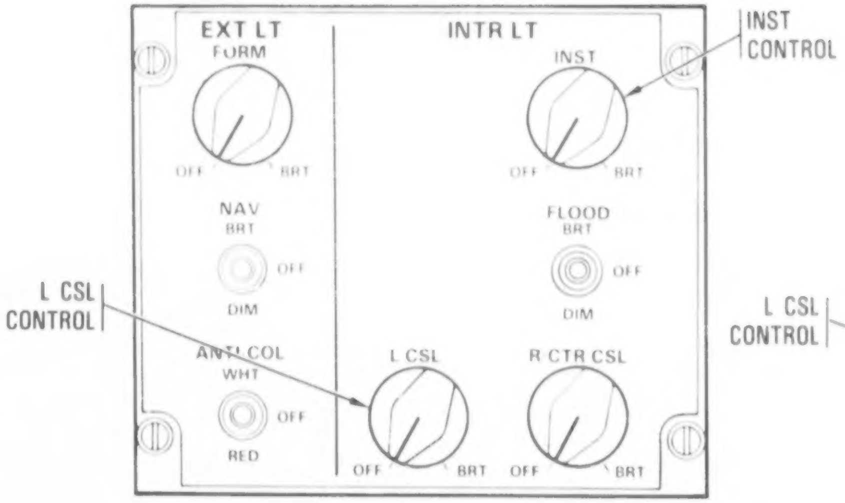
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 4-1-2	POWER PLANTS - POWER UP completed


BATT/EXT PWR SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
OFF RESET
GEN 2
TEST
TEST

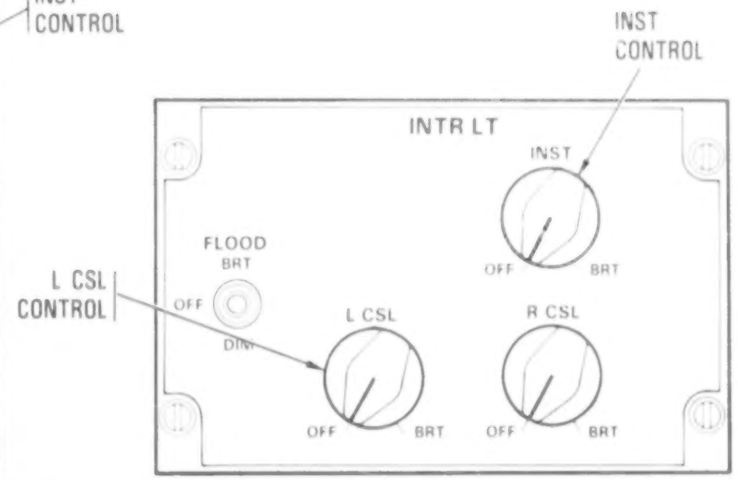
Ⓑ PILOT ELEC PWR PANEL


PILOT STATION
B
A


CPG STATION
C


INST CONTROL
L CSL CONTROL
EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R CTR CSL
OFF
BRT

Ⓐ PILOT EXT LT/INTR LT PANEL


INST CONTROL
L CSL CONTROL
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R CSL
OFF
BRT

Ⓒ CPG INTR LT PANEL

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4-1-3. POWER PLANTS - POWER DOWN (cont)

A. On pilot and CPG **INTR LT** panels, set **L CSL** controls to **OFF**.

B. On pilot and CPG **INTR LT** panels, set **INST** controls to **OFF**.

C. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **OFF**.

D. Shut down and disconnect GPU (TM 55-1520-238-23).

4-2-1. POWER PLANTS - OPERATIONAL CHECK (ENGINE 1)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692

Personnel Required:

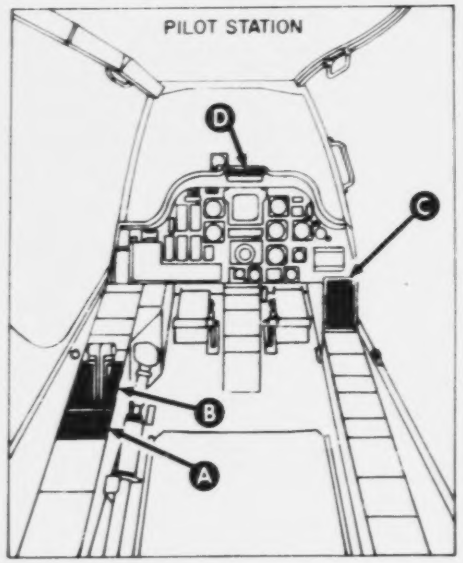
67R10 Attack Helicopter Repairer
One person to assist
100KG Pilot

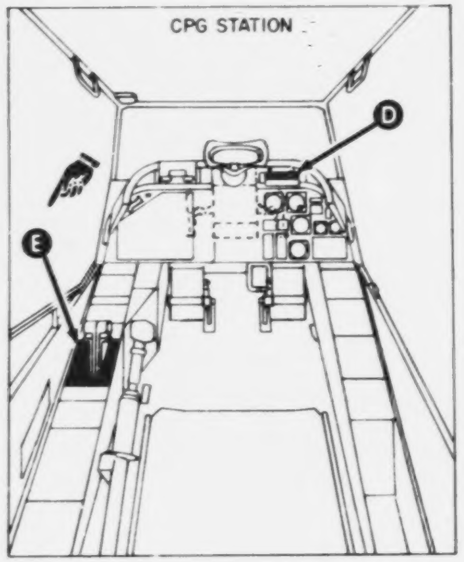
References:

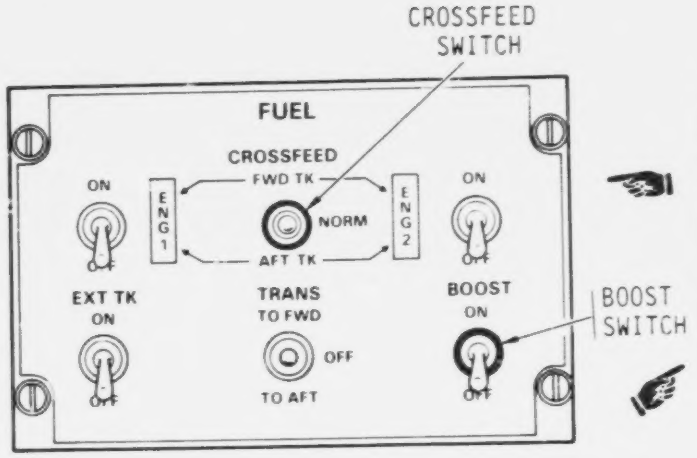
TM 55-1520-238-CL
TM 55-1520-238-23
TM 55-1520-238-MTF
TM 55-2840-248-23

Equipment Conditions:

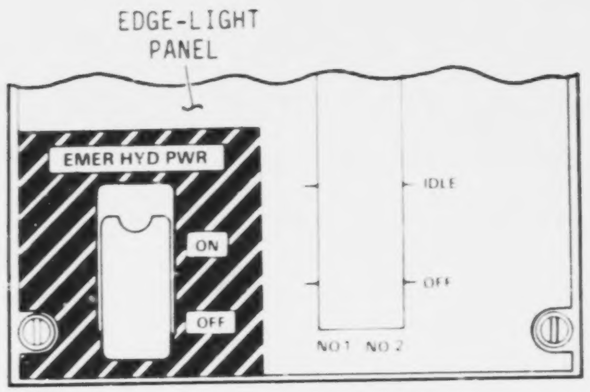
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Power plants inspection performed
	No. 1 engine Power Available Spindle rigging procedure completed
Chapter 10	FUEL SYSTEM - VISUAL CHECK completed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed
Para 13-1-3	ENVIRONMENTAL CONTROL SYSTEM - POWER UP completed


PILOT STATION
D
C
B
A

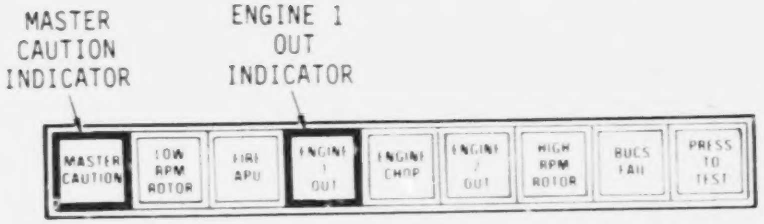

CPG STATION
D
E


CROSSFEED SWITCH
BOOST SWITCH
FUEL
CROSSFEED
FWD TK
NORM
AFT TK
ENG 1
ENG 2
ON
EXT TK
ON
OFF
TRANS TO FWD
OFF
TO AFT
BOOST
ON
OFF

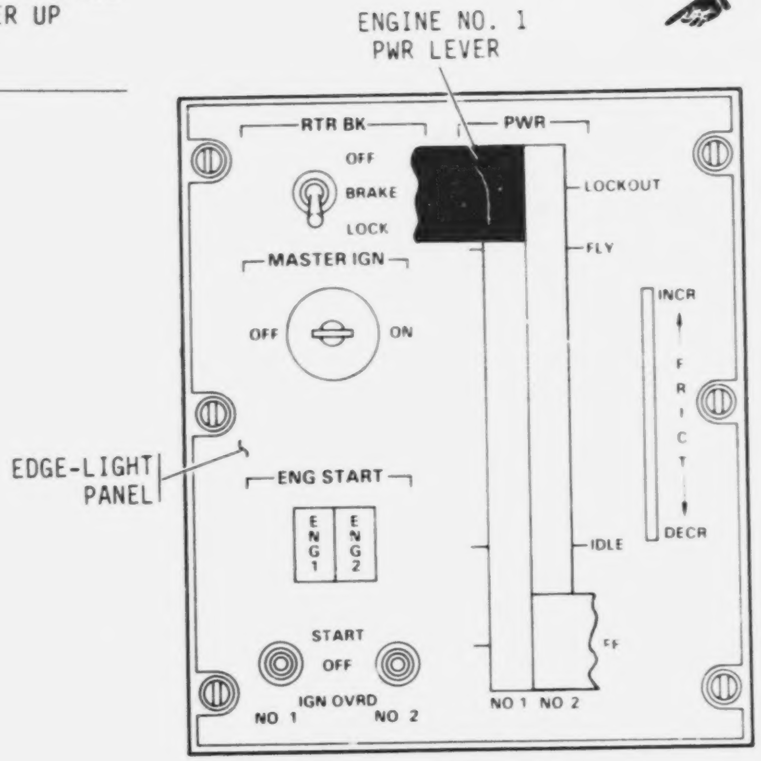
Ⓐ PILOT FUEL PANEL


EDGE-LIGHT PANEL
EMER HYD PWR
ON
OFF
IDLE
OFF
NO 1
NO 2

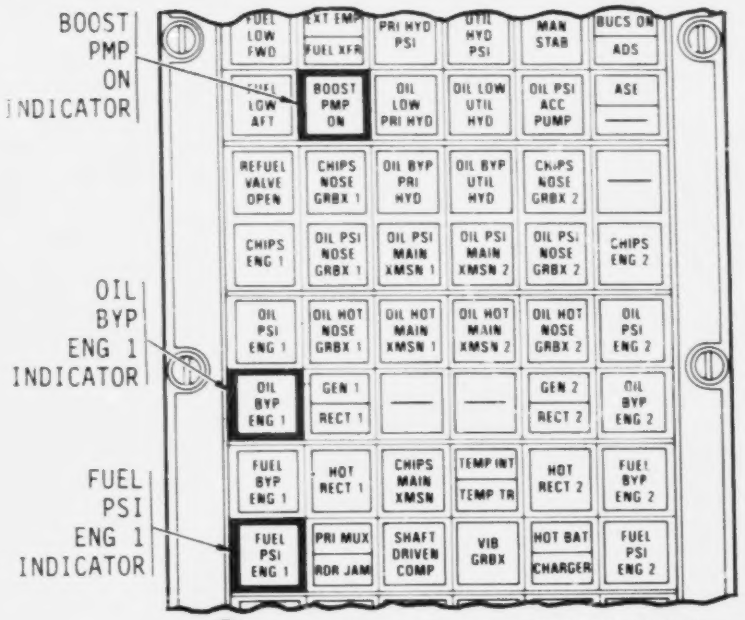
Ⓔ P/O CPG POWER QUADRANT


MASTER CAUTION INDICATOR
ENGINE 1 OUT INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

Ⓓ MASTER CAUTION/WARNING PANEL (TYPICAL)


ENGINE NO. 1 PWR LEVER
EDGE-LIGHT PANEL
RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
PWR
LOCKOUT
FLY
IDLE
INCR
FRICT
DECR
FF
NO 1
NO 2

Ⓑ PILOT POWER QUADRANT


BOOST PMP ON INDICATOR
OIL BYP ENG 1 INDICATOR
FUEL PSI ENG 1 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2

Ⓒ P/O PILOT CAUTION/WARNING PANEL

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WARNING

- Make sure helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance tasks. Failure to do so could result in death or serious injury.
- Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and seek medical aid.
- Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.
- Make certain helicopter is grounded.

CAUTION

Ensure container is placed under No. 1 engine overboard fuel drain to prevent fuel spillage.

A. Complete the operational check as follows:

NOTE

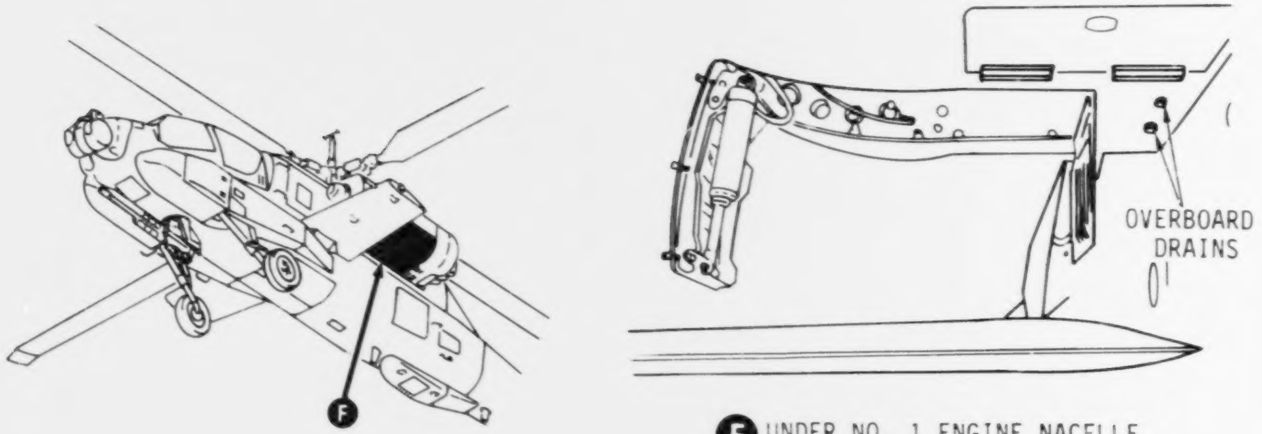
- If problem involves excessive torsional vibration and NR droop during flight maneuvers (No. 1 engine Np lags behind No. 2 Np during recovery maneuvers), go to para 4-2-43.
- The vapor vent procedure is to be performed anytime a connection is broken on any of the fuel delivery components, to insure purging of air in lines. If vapor vent procedure is not required, go to step 6.

TASK	RESULT
1. On pilot power quadrant, check that edge-lighted panel is lighted.	If pilot power quadrant edge-lighted panel does not light, go to para 4-2-47.
1.1 On CPG power quadrant, check that edge-lighted panel is lighted.	If CPG power quadrant edge-lighted panel does not light, go to para 4-2-48.
1.2 On pilot power quadrant, set **NO. 1 PWR** lever to **LOCKOUT**.	

NOTE

Fuel boost pump does not operate through pilot **FUEL** panel **BOOST** switch, unless **CROSSFEED** switch is set to **AFT TK**.

TASK	RESULT
2. On pilot FUEL panel, set **CROSSFEED** switch to **AFT TK**, and **BOOST** switch to **ON**.	
3. On pilot caution/warning panel, check that **BOOST PMP ON** indicator is lighted.	If **BOOST PMP ON** indicator is not lighted, refer to chapter 10 to troubleshoot crossfeed/boost system.
4. Have assistant check for steady flow of fuel from NO. 1 engine overboard fuel drain.	If fuel flow is not present, refer to chapter 10 to troubleshoot fuel crossfeed/boost system. If fuel crossfeed/boost system is found to be functioning properly, refer to TM 55-2840-248-23 to troubleshoot engine fuel system.
5. On pilot **FUEL** panel, set **CROSSFEED** switch to **NORM**, **BOOST** switch will move to **OFF**. Check that **BOOST PMP ON** indicator is not lighted.	If **BOOST** switch does not release to **OFF**, refer to chapter 10 to troubleshoot fuel crossfeed/boost system. If **BOOST PMP ON** indicator is lighted, refer to chapter 10 to troubleshoot fuel crossfeed/boost system.



F UNDER NO. 1 ENGINE NACELLE

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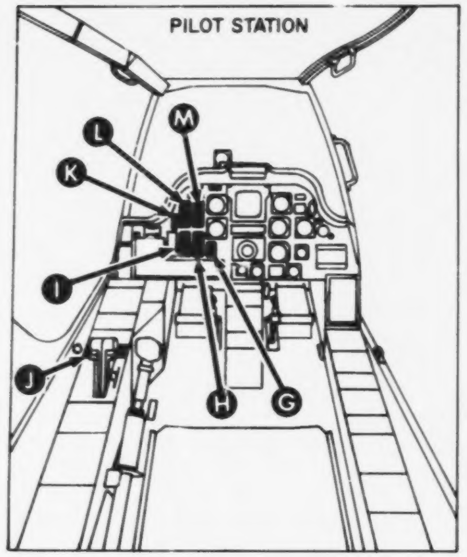
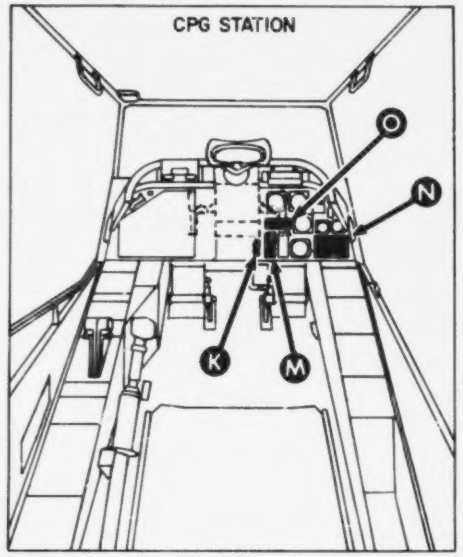
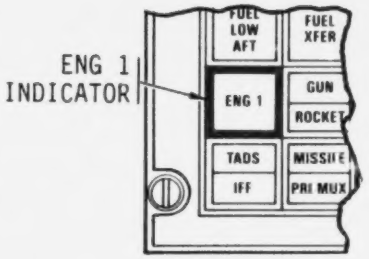
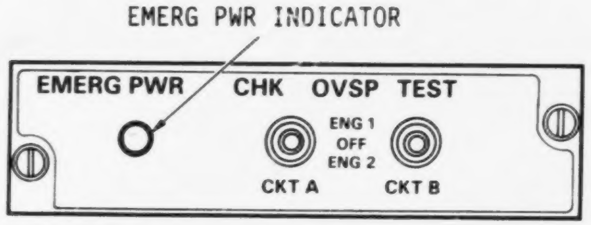
4-2-1. POWER PLANTS - OPERATIONAL CHECK (ENGINE 1) (cont)


PILOT STATION
L
M
K
I
J
H
G

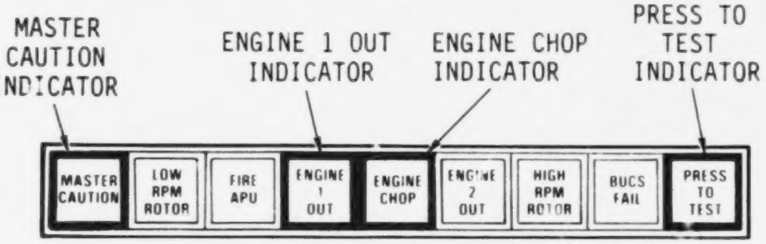

CPG STATION
O
N
K
M


ENG 1 INDICATOR
FUEL LOW AFT
FUEL XFER
ENG 1
GUN
ROCKET
TADS
IFF
MISSILE
PRI MUX

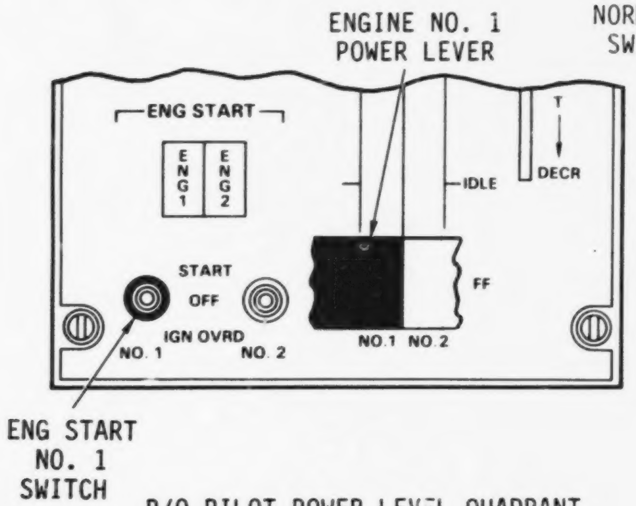
Ⓝ P/O CPG CAUTION/WARNING PANEL


EMERG PWR INDICATOR
EMERG PWR
CHK
OVSP
TEST
ENG 1
OFF
ENG 2
CKT A
CKT B

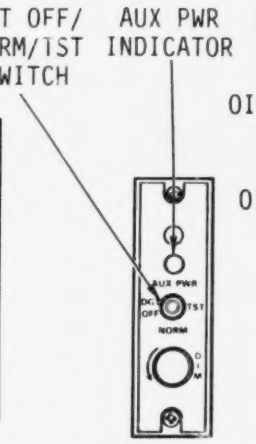
Ⓙ ENGINE OVERSPEED TEST PANEL


MASTER CAUTION INDICATOR
ENGINE 1 OUT INDICATOR
ENGINE CHOP INDICATOR
PRESS TO TEST INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

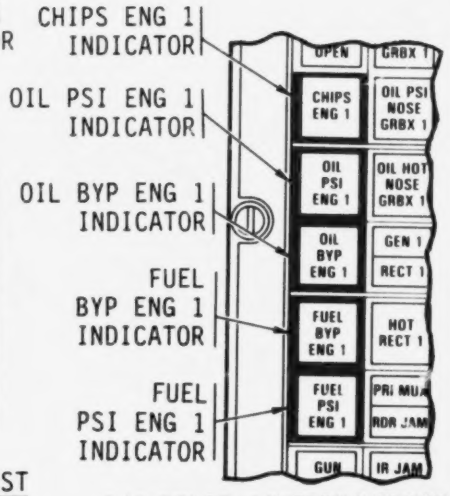
MASTER CAUTION/WARNING PANEL (TYPICAL)


ENGINE NO. 1 POWER LEVER
ENG START
ENG 1
ENG 2
IDLE
DECR
START
OFF
IGN OVRD
NO. 1
NO. 2
FF
NO.1
NO.2
ENG START NO. 1 SWITCH

P/O PILOT POWER LEVEL QUADRANT


DGT OFF/ NORM/TST SWITCH
AUX PWR INDICATOR
AUX PWR
DGT OFF
TST
NORM

Ⓚ DIM TEST PANEL (TYPICAL)


CHIPS ENG 1 INDICATOR
OIL PSI ENG 1 INDICATOR
OIL BYP ENG 1 INDICATOR
FUEL BYP ENG 1 INDICATOR
FUEL PSI ENG 1 INDICATOR
OPEN
GRBX 1
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL BYP ENG 1
GEN 1
RECT 1
FUEL BYP ENG 1
HOT RECT 1
FUEL PSI ENG 1
PRI MUX
RDR JAM
GUN
IR JAM

P/O PILOT CAUTION/WARNING PANEL

MM04/1-1141-2

TASK		RESULT
6. On pilot master caution/warning panel, depress **MASTER CAUTION** indicator. Check that the following indicators are lighted but not flashing:		If indicators continue to flash after depressing pilot **MASTER CAUTION** indicator, refer to chapter 9 to troubleshoot pilot catuion/warning system. If indicators are not lighted after pressing pilot **MASTER CAUTION** indicator, refer to chapter 9 to troubleshoot pilot caution/warning system.
Location	Indicator	
Master caution/ warning panel	**ENGINE 1 OUT**	
Pilot caution/ warning panel	**OIL PSI ENG 1** **FUEL PSI ENG 1**	
7. On CPG master caution/warning panel, depress **MASTER CAUTION** indicator. Check that the following indicators are lighted but not flashing.		If **ENG 1 OUT** indicator is not lighted, refer to chapter 9 to troubleshoot CPG caution/warning system. If **ENG 1** indicator is not lighted, refer to chapter 9 to troubleshoot CPG caution/warning system.
Location	Indicator	
Master caution/ warning panel	**ENGINE 1 OUT**	
CPG caution/ warning panel	**ENG 1**	

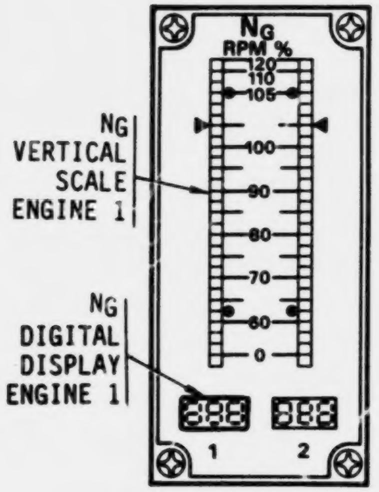
GO TO NEXT PAGE

4-2-1. POWER PLANTS - OPERATIONAL CHECK (ENGINE 1) (cont)

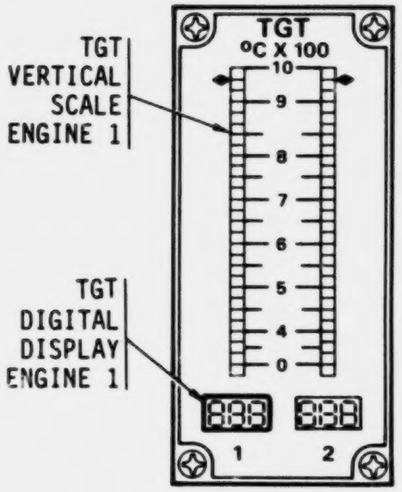
	TASK	RESULT
8.	On pilot master caution/warning panel, depress **PRESS TO TEST** indicator. Check that the following indicators in pilot station are lignted:	If indicators are not lighted, refer to chapter 9 to troubleshoot pilot caution/warning system.

Location	Indicator
Master caution/ warning panel	**ENGINE CHOP**
Pilot caution/ warning panel	**CHIPS ENG 1** **OIL BYP ENG 1** **FUEL BYP ENG 1**
Engine overspeed test panel	**EMERG PWR**
Pilot power quadrant	**ENG START ENG 1**
Engine instrument test panel	**AUX PWR**

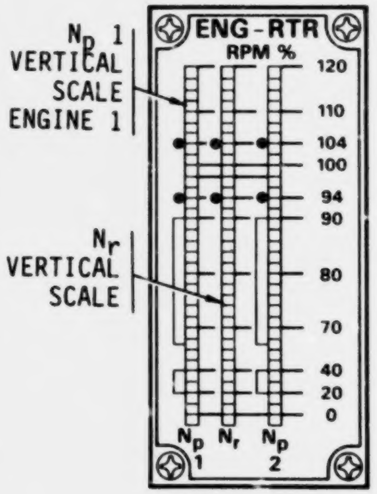
	TASK	RESULT
9.	Depress **PRESS TO TEST** indicator on CPG master caution/warning panel. Check that **ENGINE CHOP** indicator is lighted.	If **ENGINE CHOP** indicator does not light, refer to chapter 9 to troubleshoot CPG caution/warning system.
10.	On pilot instrument panel, place **DGT OFF/NORM/TST** switch to **TST**. Check that **TGT**, **N_G**, **ENG-RTR**, **TORQUE** and **ENG OIL** indicators show full scale readings for three seconds. Check that digital displays show all 8's.	If **TGT**, **N_G**, **ENG-RTR**, **TORQUE** or **ENG OIL** indicators do not go to full scale for three seconds or do not show all 8's in digital displays, refer to chapter 8 to troubleshoot engine instruments.
11.	Place **DGT OFF/NORM/TST** switch to **TST**. Check that **TGT**, **N_G**, **ENG-RTR**, **TORQUE** and **ENG OIL** indicators light and/or that **LEFT/FWD** and **RIGHT/AFT** digital displays show all 8's on CPG selectable digital display panel.	If **TGT**, **N_G**, **ENG-RTR**, **TORQUE** or **ENG OIL** indicators do not light or digital displays do not show all 8's refer to chapter 8 to troubleshoot engine instruments.


NG VERTICAL SCALE ENGINE 1
NG DIGITAL DISPLAY ENGINE 1
NG RPM %
120
110
105
100
90
80
70
60
0
888
888
1
2

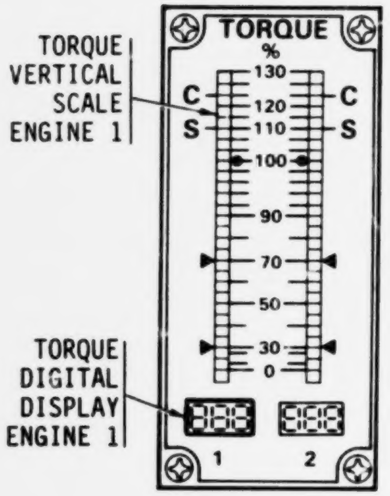
Ⓘ GAS GENERATOR RPM GAGE


TGT VERTICAL SCALE ENGINE 1
TGT DIGITAL DISPLAY ENGINE 1
TGT
°C X 100
10
9
8
7
6
5
4
0
888
888
1
2

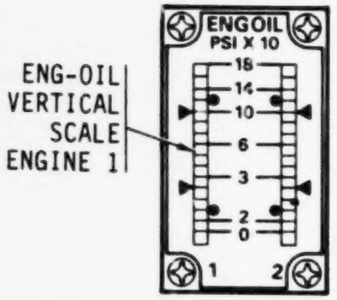
Ⓛ TURBINE GAS TEMPERATURE GAGE


Np 1 VERTICAL SCALE ENGINE 1
Nr VERTICAL SCALE
ENG-RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2

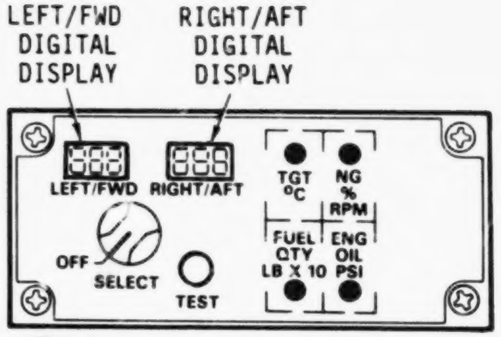
Ⓗ ENG-RTR INDICATOR (TYPICAL)


TORQUE VERTICAL SCALE ENGINE 1
TORQUE DIGITAL DISPLAY ENGINE 1
TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
C
S
888
888
1
2

Ⓜ TORQUE INDICATOR (TYPICAL)


ENG-OIL VERTICAL SCALE ENGINE 1
ENG OIL
PSI X 10
16
14
10
6
3
2
0
1
2

Ⓖ PILOT ENG OIL INDICATOR


LEFT/FWD DIGITAL DISPLAY
RIGHT/AFT DIGITAL DISPLAY
LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST

Ⓞ CPG SELECTABLE DIGITAL DISPLAY PANEL

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GO TO NEXT PAGE

4-2-1. POWER PLANTS - OPERATIONAL CHECK (ENGINE 1) (cont)

TASK	RESULT
12. Move engine **NO. 1 PWR** lever to **OFF**. Place engine **NO. 1** start switch to **IGN OVRD**. Check cockpit ECS outlets for loss of air flow and that engine 1 accelerates to and remains between 23 percent and 25 percent N_G. After 30 seconds place engine **NO. 1** start switch to **OFF**.	If engine 1 does not accelerate to or remain between 23 percent and 25 percent N_G, go to para 4-2-5. If air flow from ECS outlets does not stop, go to para 4-2-41.

NOTE

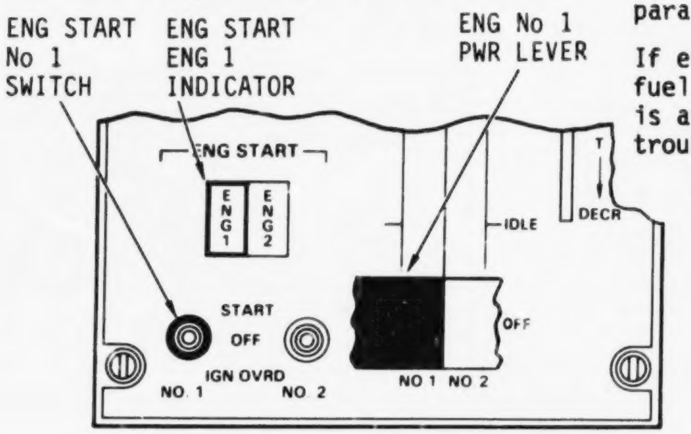
- If Step 12 was successfully performed using External Power - Pressurized Air, go to Step 12.1.
- If Step 12 was successfully performed using on-board IPAS, go to Step 13.

TASK	RESULT
12.1 Start and operate APU (TM 55-1520-238-CL).	
12.2 Remove External Power-Pressurized Air, only (TM 55-1520-238-23).	
12.3 Repeat Step 12.	If engine 1 does not accelerate to or remain between 23 percent and 25 percent N_G, refer to Chapter 7 to troubleshoot Pressurized Air System.

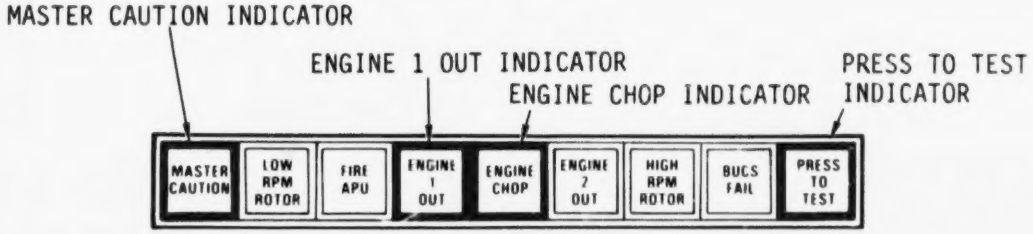
CAUTION

If engine overtemperature or hang start occurs or **ENG 1** start indicator remains lighted above 52 percent N_G, shut down engine 1. If positive oil pressure does not occur within 30 seconds after N_G begins to increase shut down engine 1.

TASK	RESULT
13. Start engine 1 (TM 55-1520-238-CL).	If engine 1 does not start, go to para 4-2-35. If engine 1 starts, then flames out, and fuel crossfeed/shutoff valve indicator is at **NORMAL**, refer to chapter 10 to troubleshoot fuel system. If hang start occurs (TGT increases, but N_G does not reach idle speed), refer to TM 55-2840-248-23 to troubleshoot engine. If pilot **ENG OIL** indicator does not indicate positive oil pressure within 30 seconds of N_G increase, refer to chapter 8 to troubleshoot engine instruments. If **TGT** indicator exceeds 867 °C (1560 °F) during start, refer to TM 55-1520-248-23 to troubleshoot engine. If CPG selectable digital display panel, **N_G, TGT, ENG-RTR, TORQUE** or **ENG OIL** indicators do not indicate, refer to chapter 8 to troubleshoot engine instruments.
13.1 Check that **ENG START NO. 1** indicator is not lighted when N_G is greater than 52 percent.	If **ENG START NO.** 1 indicator does not light, go to para 4-2-7. If **ENG START NO.** 1 indicator remains lighted above 52 percent N_G, go to para 4-2-8.
13.2 Check that **ENGINE 1 OUT** indicators on pilot and CPG master caution/warning panels are not lighted.	If **ENG 1 OUT** indicators are lighted, go to para 4-2-9.
13.3 Check that **ENG START** circuit breaker stays closed.	If **ENG START** circuit breaker does not stay closed, go to para 4-2-6.


ENG START No 1 SWITCH
ENG START ENG 1 INDICATOR
ENG No 1 PWR LEVER
ENG START
ENG 1
ENG 2
IDLE
DECR
T
START
OFF
IGN OVRD
NO. 1
NO. 2
OFF
NO 1 NO 2

P/O PILOT POWER QUADRANT


MASTER CAUTION INDICATOR
ENGINE 1 OUT INDICATOR
ENGINE CHOP INDICATOR
PRESS TO TEST INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL (TYPICAL)

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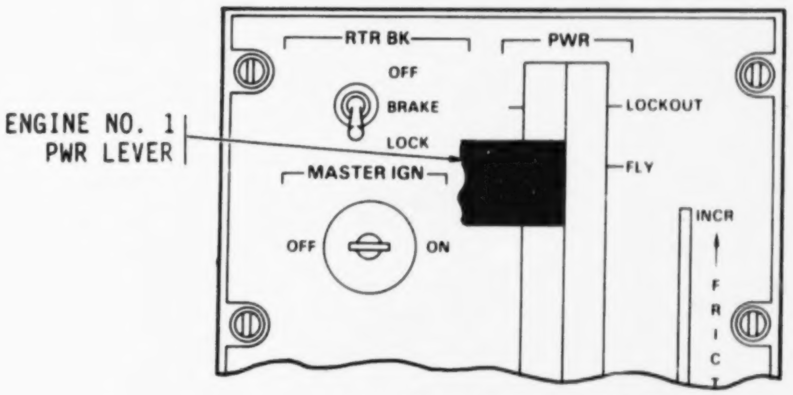
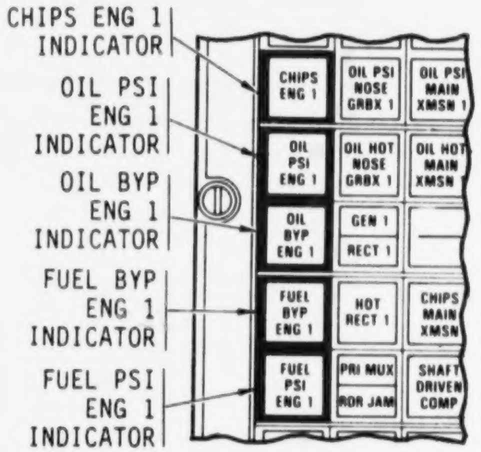
GO TO NEXT PAGE

4-2-1. POWER PLANTS - OPERATIONAL CHECK (ENGINE 1) (cont)

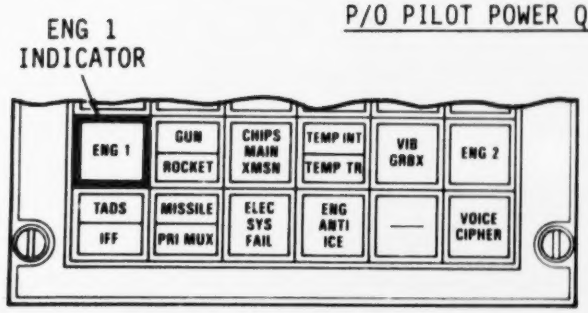
	TASK	RESULT
14.	Move engine **NO. 1 PWR** lever to FLY. On engine overspeed test panel, place **CKT A** switch to **ENG 1**. Check that engine 1 N_G remains stable and release **CKT A** switch. Place **CKT B** switch to **ENG 1**. Check that engine 1 N_G remains stable and **EMERG PWR** indicator is lighted. Release **CKT B** switch. Place **CKT A** and **CKT B** switches to **ENG 1** and check for a drop in engine 1 N_G. Release switches.	If N_G does not remain stable with **CKT A** switch closed, go to para 4-2-10. If N_G does not remain stable with **CKT B** switch closed, go to para 4-2-11. If **EMERG PWR** indicator is not lighted with **CKT B** switch closed, go to para 4-2-39. If N_G does not decrease with **CKT A** and **CKT B** switches closed, go to para 4-2-12. If engine 1 does not relight with **CKT A** and **CKT B** switches released, go to para 4-2-41.


ENGINE NO. 1 PWR LEVER
RTR BK
OFF
BRAKE
LOCK
PWR
LOCKOUT
FLY
MASTER IGN
OFF
ON
INCR
FRICT

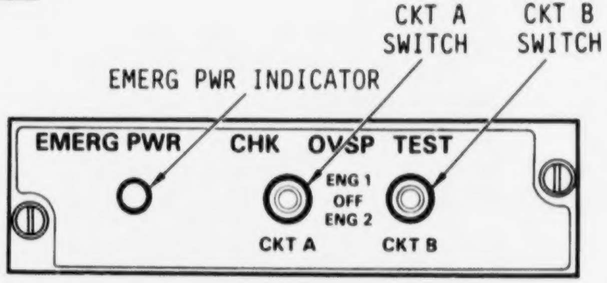
P/O PILOT POWER QUADRANT


CHIPS ENG 1 INDICATOR
OIL PSI ENG 1 INDICATOR
OIL BYP ENG 1 INDICATOR
FUEL BYP ENG 1 INDICATOR
FUEL PSI ENG 1 INDICATOR
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN
OIL BYP ENG 1
GEN 1
RECT 1
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP

P/O PILOT CAUTION/WARNING PANEL


ENG 1 INDICATOR
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

P/O CPG CAUTION/WARNING PANEL


CKT A SWITCH
CKT B SWITCH
EMERG PWR INDICATOR
EMERG PWR
CHK OVSP TEST
ENG 1
OFF
ENG 2
CKT A
CKT B

ENGINE OVERSPEED TEST PANEL

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	TASK	RESULT
15.	Check that the following indicators on the pilot caution/warning panel are not lighted: CHIPS ENG 1 OIL BYP ENG 1 OIL PSI ENG 1 FUEL BYP ENG 1 FUEL PSI ENG 1	If **OIL PSI ENG 1** indicator is lighted, go to para 4-2-37. If **CHIPS ENG 1** indicator is lighted, check for metal chips on chip detector (TM 55-2840-248-23). If chips are not present, go to para 4-2-13. If **OIL BYP ENG 1** indicator is lighted, check for clogged oil filter (TM 55-2840-248-23). If filter is not clogged, go to para 4-2-14. If **FUEL BYP ENG 1** indicator is lighted, check for clogged fuel filter (TM 55-2840-248-23). If fuel filter is not clogged, go to para 4-2-15. If **FUEL PSI ENG 1** indicator is lighted, go to para 4-2-16.
16.	On CPG caution/warning panel, check that **ENG 1** indicator is not lighted.	If **ENG 1** indicator on CPG caution/warning panel is lighted, refer to chapter 9 to troubleshoot CPG caution/warning system.
17.	Move pilot engine **NO. 1 PWR** lever to **LOCKOUT**, and at first indication of N_G, N_r, or N_p increase, immediately move engine **NO. 1 PWR** lever back to a position midway between **FLY** and **IDLE**. Check that N_G, N_r, and N_p decrease and stabilize. Move engine **NO 1 PWR** lever to **IDLE**, then to **FLY**.	If N_G, N_r or N_p do not increase or are fluctuating, refer to TM 55-2840-248-23 to troubleshoot engines. If N_p fluctuates refer to TM 55-1520-238-23 to adjust No. 1 engine turbine speed control unit.
18.	Repeat step 17 above using CPG engine **NO. 1 PWR** lever.	If CPG **NO. 1 PWR** lever cannot be adjusted to **LOCKOUT**, go to para 4-2-17.

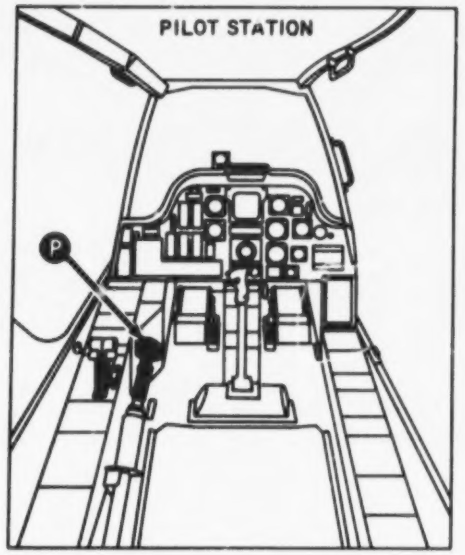
GO TO NEXT PAGE

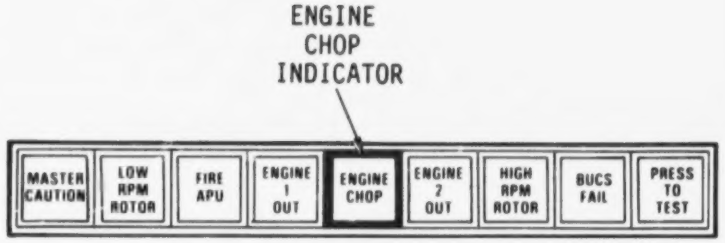
4-2-1. POWER PLANTS - OPERATIONAL CHECK (ENGINE 1) (cont)

TASK	RESULT
19. Push forward and turn pilot collective stick chop collar clockwise until **ENGINE CHOP** indicator lights. Release chop collar. Check that engine 1 N_G stabilizes at **IDLE.** Move engine **NO. 1 PWR** lever to **IDLE.** Push forward and turn pilot engine chop collar counterclockwise until **ENGINE CHOP** indicator goes out. Release chop collar. Check that N_G, TGT, and N_p are stabilized. Move engine **NO. 1 PWR** lever to **FLY.**	If pilot **ENGINE CHOP** indicator does not light, go to para 4-2-18. If engine 1 N_G does not decrease to and stabilize at **IDLE**, replace engine no. 1 chop relay (TM 55-1520-238-23). If **NO. 1 PWR** lever is advanced to **FLY** and engine 1 does not accelerate, go to para 4-2-19. If pilot **ENGINE CHOP** indicator does not go out, refer to chapter 9 to troubleshoot pilot caution/warning system.
20. Repeat step 19 using CPG collective stick chop collar and engine **NO. 1 PWR** lever.	If CPG **ENGINE CHOP** indicator does not light, go to para 4-2-20. If engine 1 N_G does not decrease to and stabilize at idle, replace engine No. 1 chop relay (TM 55-1520-238-23). If CPG **ENGINE CHOP** indicator does not go out, refer to chapter 9 to troubleshoot CPG caution/warning system. If **NO. 1 PWR** lever is advanced to **FLY** and engine 1 does not accelerate, go to para 4-2-21.

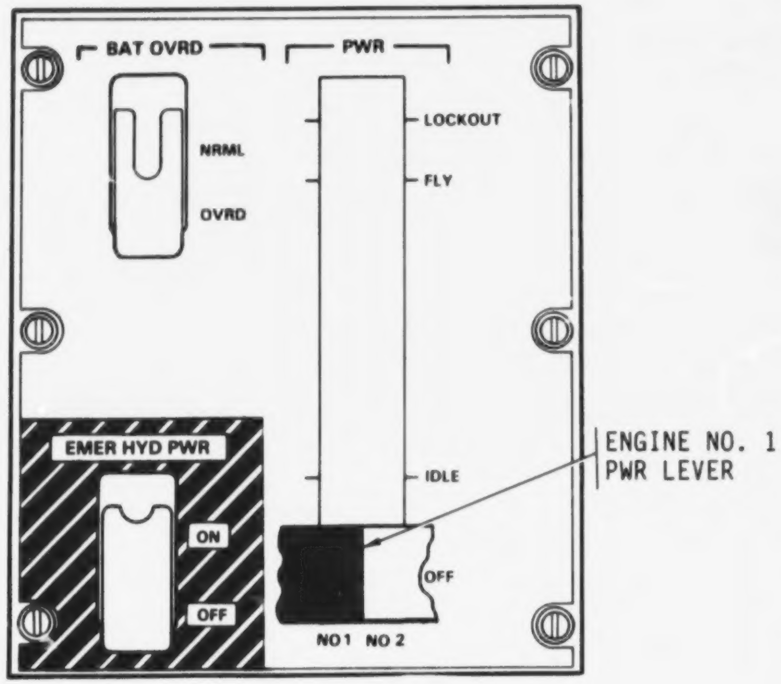
B. Perform POWER PLANTS - POWER DOWN (para 4-1-3).

C. Perform maintenance test flight (TM 55-1520-238-MTF).

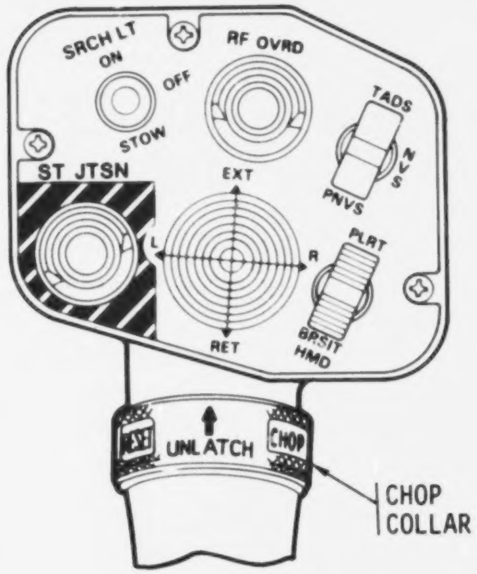

PILOT STATION
P


ENGINE CHOP INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL (TYPICAL)


BAT OVRD
PWR
NRML
OVRD
LOCKOUT
FLY
IDLE
OFF
EMER HYD PWR
ON
OFF
NO 1
NO 2
ENGINE NO. 1 PWR LEVER

CPG POWER QUADRANT


SRCH LT
ON
OFF
STOW
RF OVRD
TADS
NVS
PNVS
ST JTSN
EXT
L
R
RET
PLRT
BRSIT HMD
RESET
UNLATCH
CHOP
CHOP COLLAR

Ⓟ P/O COLLECTIVE STICK (TYPICAL)

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END OF TASK

4-2-2. POWER PLANTS - OPERATIONAL CHECK (ENGINE 2) 4-2-2

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-313-4692

Personnel Required:

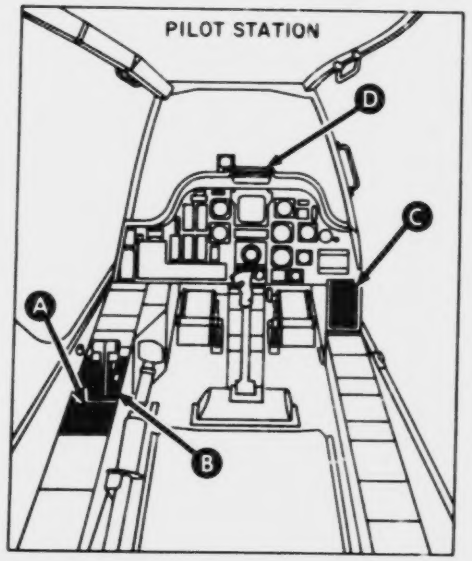
67R10	Attack Helicopter Repairer One person to assist
100KG	Pilot

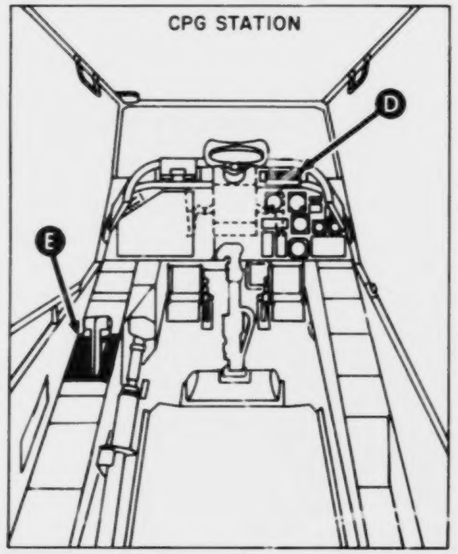
References:

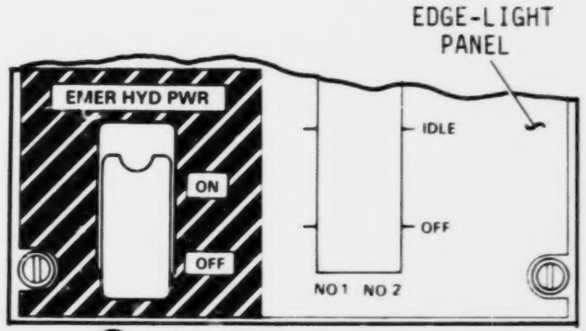
TM 55-1520-238-CL
TM 55-1520-238-23
TM 55-1520-238-MTF
TM 55-2840-248-23

Equipment Conditions:

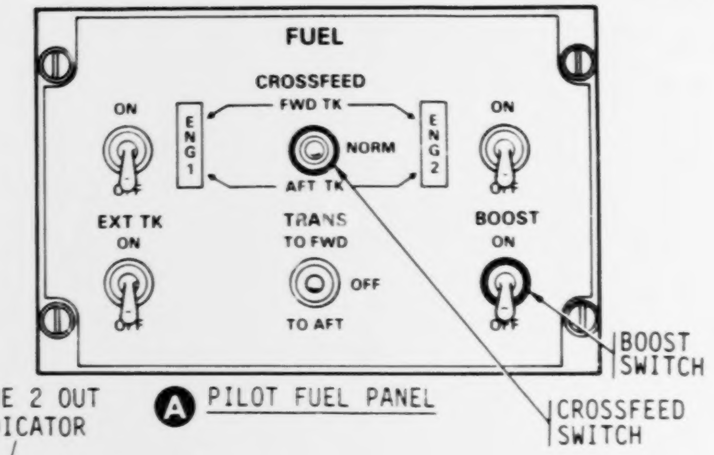
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Power plants inspection performed
	No. 2 engine Power Available Spindle rigging procedure completed
Chapter 10	FUEL SYSTEM - VISUAL CHECK completed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed
Para 13-1-3	ENVIRONMENTAL CONTROL SYSTEM - POWER UP completed


PILOT STATION
A
B
C
D

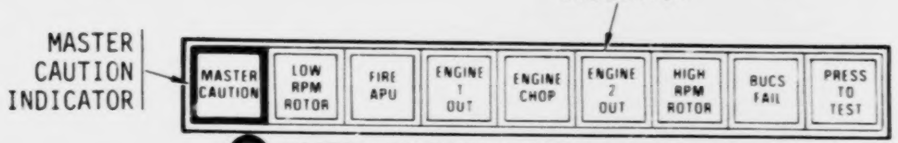

CPG STATION
D
E


EDGE-LIGHT PANEL
EMER HYD PWR
ON
OFF
IDLE
OFF
NO 1 NO 2

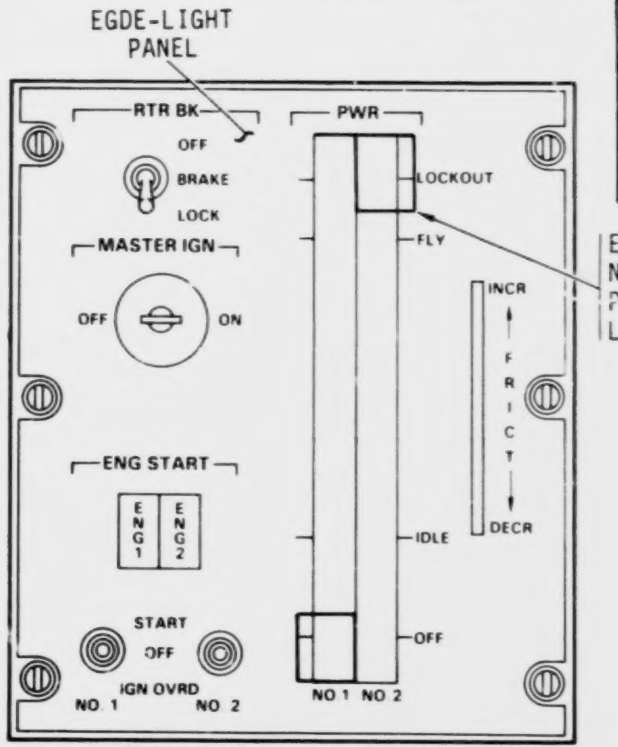
E P/O CPG POWER QUADRANT


FUEL
CROSSFEED
FWD TK
NORM
AFT TK
ON
ENG 1
ENG 2
ON
OFF
OFF
EXT TK
ON
OFF
TRANS TO FWD
OFF
TO AFT
BOOST
ON
OFF
BOOST SWITCH
CROSSFEED SWITCH

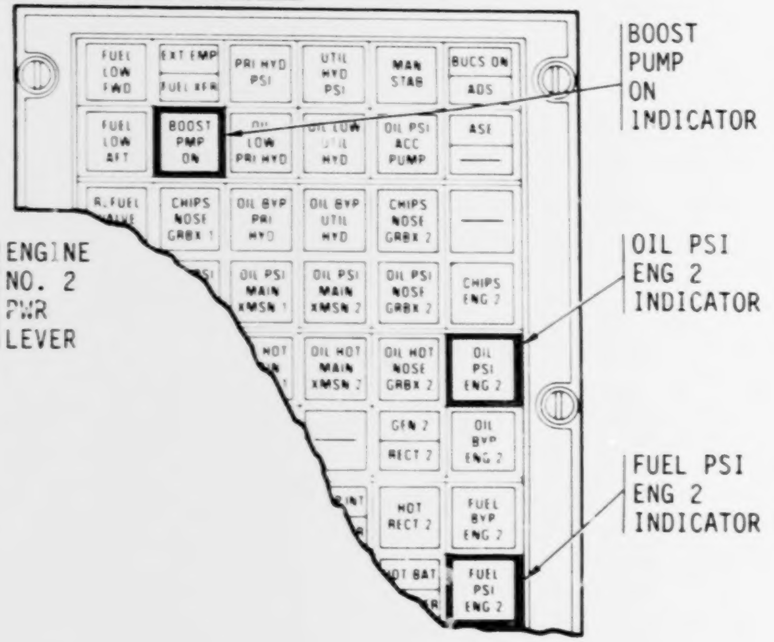
A PILOT FUEL PANEL


ENGINE 2 OUT INDICATOR
MASTER CAUTION INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

D MASTER CAUTION /WARNING PANEL (TYPICAL)


EGDE-LIGHT PANEL
RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO. 1
NO 2
PWR
LOCKOUT
FLY
INCR
FRICT
DECR
IDLE
OFF
NO 1 NO 2
ENGINE NO. 2 PWR LEVER

B PILOT POWER QUADRANT


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
LOW PRI HYD
UTIL HYD
OIL PSI ACC PUMP
ASI
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
GEN 2
RECT 2
OIL BYP ENG 2
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 2
BOOST PUMP ON INDICATOR
OIL PSI ENG 2 INDICATOR
FUEL PSI ENG 2 INDICATOR

C P/O PILOT CAUTION WARNING PANEL

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GO TO NEXT PAGE

4-2-2. POWER PLANTS - OPERATIONAL CHECK (ENGINE 2) (cont)

WARNING

- **Make sure helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance tasks. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and seek medical aid.**
- **Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.**
- **Make certain helicopter is grounded.**

CAUTION

Ensure container is placed under No. 2 engine overboard fuel drain to prevent fuel spillage.

A. Complete the operational check as follows:

NOTE

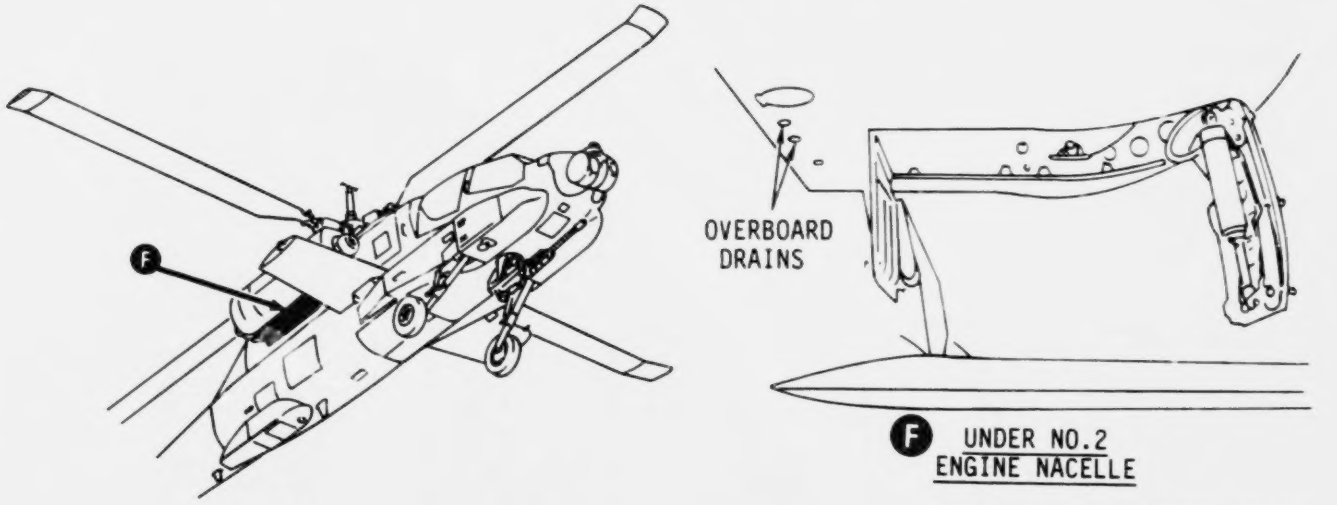
- If problem involves excessive torsional vibration and **NR** droop during flight maneuvers (No. 2 engine Np lags behind No. 1 Np during recovery maneuvers), go to para 4-2-44.
- The vapor vent procedure is to be performed anytime a connection is broken on any of the fuel delivery components, to insure purging of air in lines. If vapor vent procedure is not required, go to step 6.

TASK	RESULT
1. On pilot power quadrant, check that edge-lighted panel is lighted.	If pilot power quadrant edge-lighted panel does not light, go to para 4-2-47.
1.1 On CPG power quadrant, check that edge-lighted panel is lighted.	If CPG power quadrant edge-lighted panel does not light, go to para 4-2-48.
1.2 On pilot power quadrant, set **NO. 2 PWR** lever to **LOCKOUT**.	

NOTE

Fuel boost pump does not operate through pilot **FUEL** panel **BOOST** switch, unless **CROSSFEED** switch is set to **AFT TK**.

TASK	RESULT
2. On pilot FUEL panel, set **CROSSFEED** switch to **AFT TK**, and **BOOST** switch to **ON**.	
3. On pilot caution/warning panel, check that **BOOST PMP ON** indicator is lighted.	If **BOOST PMP ON** indicator is not lighted, refer to chapter 10 to troubleshoot crossfeed/boost system.
4. Have assistant check for steady flow of fuel from NO. 2 engine overboard fuel drain.	If fuel flow is not present, refer to chapter 10 to troubleshoot fuel crossfeed/boost system. If fuel crossfeed/boost system is found to be functioning properly, refer to TM 55-2840-248-23 to troubleshoot engine fuel system.
5. On pilot **FUEL** panel, set **CROSSFEED** switch to **NORM**, **BOOST** switch will move to **OFF**. Check that **BOOST PMP ON** indicator is not lighted.	If **BOOST** switch does not release to **OFF**, refer to chapter 10 to troubleshoot fuel crossfeed/boost system. If **BOOST PMP ON** indicator is lighted, refer to chapter 10 to troubleshoot fuel crossfeed/boost system.



MM04/1-1142-3

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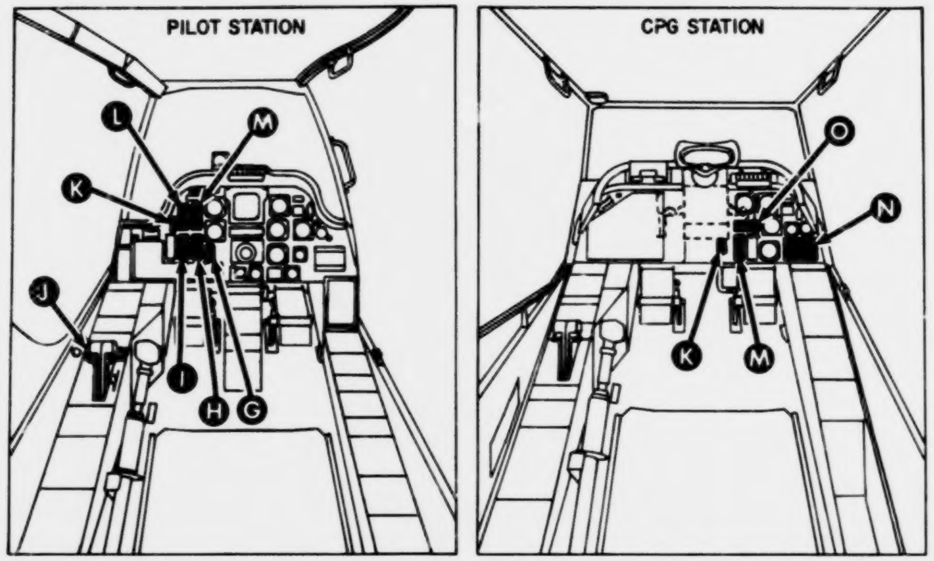
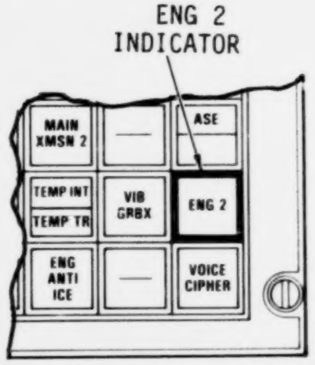
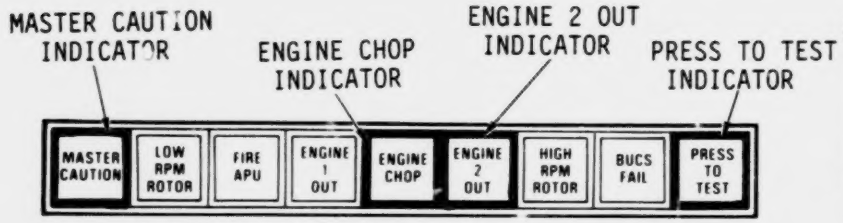
4-2-2. POWER PLANTS - OPERATIONAL CHECK (ENGINE 2) (cont)

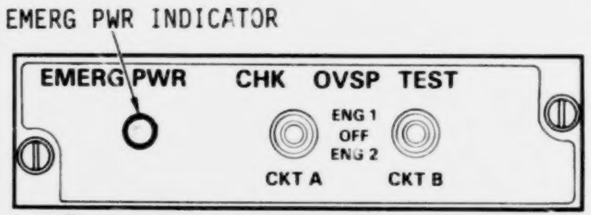

PILOT STATION
L
M
K
J
I
H
G
CPG STATION
O
N
K
M


ENG 2 INDICATOR
MAIN XMSN 2
ASE
TEMP INT
TEMP TR
VIB GRBX
ENG 2
ENG ANTI ICE
VOICE CIPHER

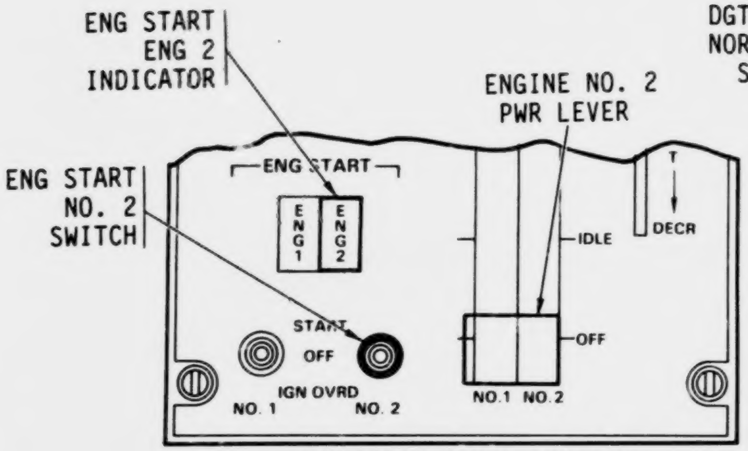
N P/O CPG CAUTION/WARNING PANEL


MASTER CAUTION INDICATOR
ENGINE CHOP INDICATOR
ENGINE 2 OUT INDICATOR
PRESS TO TEST INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

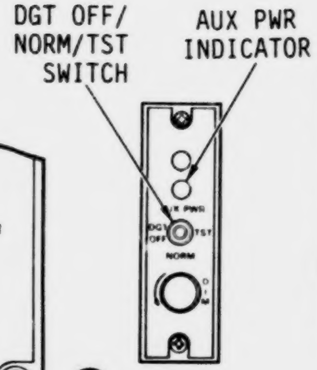
MASTER CAUTION/WARNING PANEL (TYPICAL)


EMERG PWR INDICATOR
EMERG PWR
CHK OVSP TEST
ENG 1
OFF
ENG 2
CKT A
CKT B

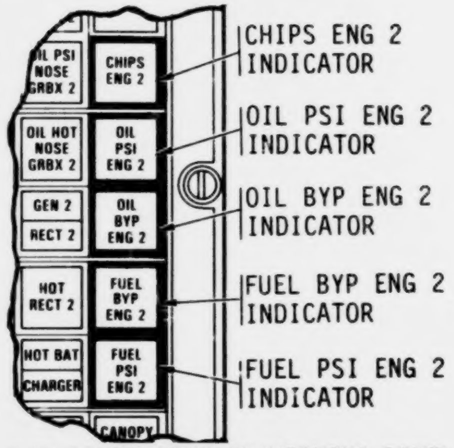
J ENGINE OVERSPEED TEST PANEL


ENG START ENG 2 INDICATOR
ENG START NO. 2 SWITCH
ENGINE NO. 2 PWR LEVER
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO. 1
NO. 2
IDLE
OFF
DECR
NO.1 NO.2

P/O PILOT POWER QUADRANT


DGT OFF/ NORM/TST SWITCH
AUX PWR INDICATOR
AUX PWR
DGT OFF
TST
NORM

K DIM TEST PANEL (TYPICAL)


OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
GEN 2
RECT 2
OIL BYP ENG 2
HOT RECT 2
FUEL BYP ENG 2
HOT BAT
CHARGER
FUEL PSI ENG 2
CANOPY
CHIPS ENG 2 INDICATOR
OIL PSI ENG 2 INDICATOR
OIL BYP ENG 2 INDICATOR
FUEL BYP ENG 2 INDICATOR
FUEL PSI ENG 2 INDICATOR

P/O PILOT CAUTION/WARNING PANEL

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TASK		RESULT
6. On pilot master caution/warning panel, depress **MASTER CAUTION** indicator. Check that the following indicators are lighted but not flashing:		If indicators continue to flash after pressing pilot **MASTER CAUTION** indicator, refer to chapter 9 to troubleshoot pilot caution/warning system.
Location	Indicator	If indicators are not lighted after pressing pilot **MASTER CAUTION** indicator, refer to chapter 9 to troubleshoot pilot caution/warning system.
Master caution/ warning panel	ENGINE 2 OUT	
Pilot caution/ warning panel	OIL PSI ENG 2 FUEL PSI ENG 2	
7. On CPG master caution/warning panel, depress **MASTER CAUTION** indicator. Check that the following indicators are lighted but not flashing.		If **ENG 2 OUT** indicator is not lighted, refer to chapter 9 to troubleshoot CPG caution/warning system.
Location	Indicator	If **ENG 2** indicator is not lighted, refer to chapter 9 to troubleshoot CPG caution/warning system.
Master caution/ warning panel	ENGINE 2 OUT	
CPG caution/ warning panel	ENG 2	

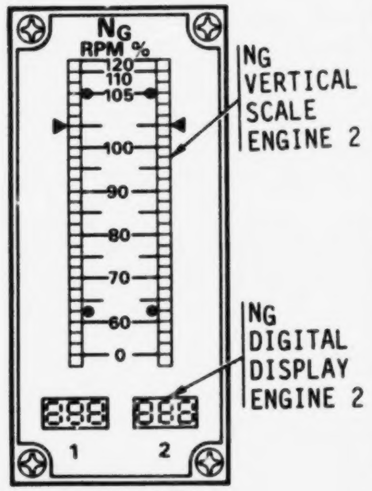
GO TO NEXT PAGE

4-2-2. POWER PLANTS - OPERATIONAL CHECK (ENGINE 2) (cont)

TASK	RESULT
8. On pilot master caution/warning panel, depress **PRESS TO TEST** indicator. Check that the following indicators in pilot station are lighted:	If indicators are not lighted, refer to chapter 9 to troubleshoot pilot caution/warning system.

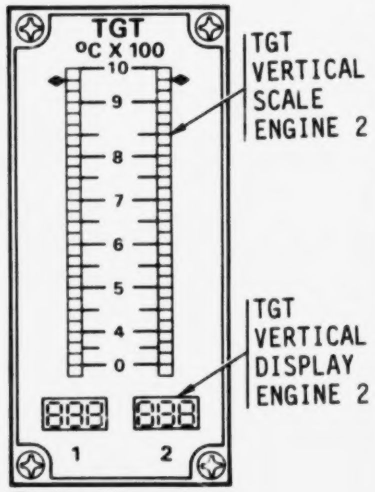
Location	Indicator
Master caution/ warning panel	**ENGINE CHOP**
Pilot caution/ warning panel	**CHIPS ENG 2** **OIL BYP ENG 2** **FUEL BYP ENG 2**
Engine overspeed test panel	**EMERG PWR**
Pilot power quadrant	**ENG START ENG 2**
Engine instrument test panel	**AUX PWR**

TASK	RESULT
9. Depress **PRESS TO TEST** indicator on CPG master caution/warning panel. Check that **ENGINE CHOP** indicator is lighted.	If **ENGINE CHOP** indicator does not light, refer to chapter 9 to troubleshoot CPG caution/warning system.
10. On pilot instrument panel, place **DGT OFF/NORM/TST** switch to **TST**. Check that **TGT**, **N_G**, **ENG-RTR**, **TORQUE** and **ENG OIL** indicators show full scale readings for three seconds. Check that digital displays show all 8's.	If **TGT**, **N_G**, **ENG-RTR**, **TORQUE** or **ENG OIL** indicators do not go to full scale for three seconds or do not show all 8's in digital displays, refer to chapter 8 to troubleshoot engine instruments.
11. Place **DGT OFF/ NORM/TST** switch to **TST**. Check that **TGT**, **N_G**, **ENG-RTR**, **TORQUE** and **ENG OIL** indicators light and/or that **LEFT/FWD** and **RIGHT/AFT** digital displays show all 8's. on CPG selectable digital display panel.	If **TGT**, **N_G**, **ENG-RTR**, **TORQUE** or **ENG OIL** indicators do not light or digital displays do not show all 8's, refer to chapter 8 to troubleshoot engine instruments.



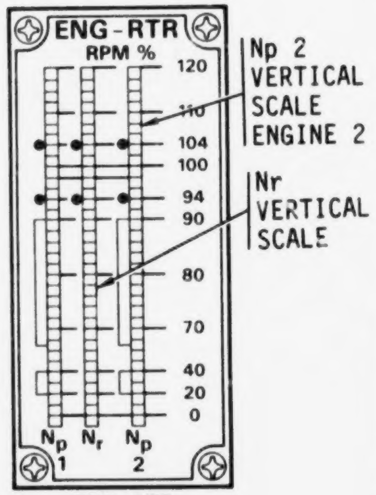
N_G
RPM %
120
110
105
100
90
80
70
60
0
888 888
1
2
NG VERTICAL SCALE ENGINE 2
NG DIGITAL DISPLAY ENGINE 2

M GAS GENERATOR RPM INDICATOR



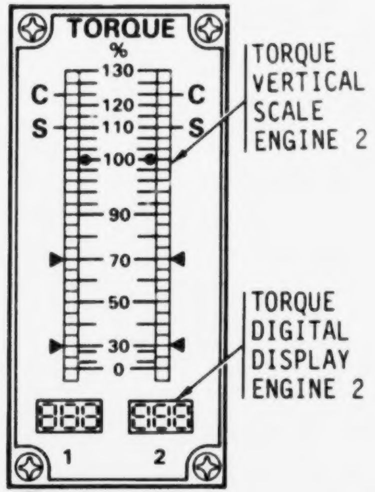
TGT
°C X 100
10
9
8
7
6
5
4
0
888 888
1
2
TGT VERTICAL SCALE ENGINE 2
TGT VERTICAL DISPLAY ENGINE 2

I TURBINE GAS TEMPERATURE INDICATOR



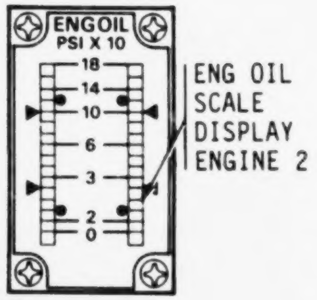
ENG - RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2
Np 2 VERTICAL SCALE ENGINE 2
Nr VERTICAL SCALE

L ENG-RTR INDICATOR (TYPICAL)



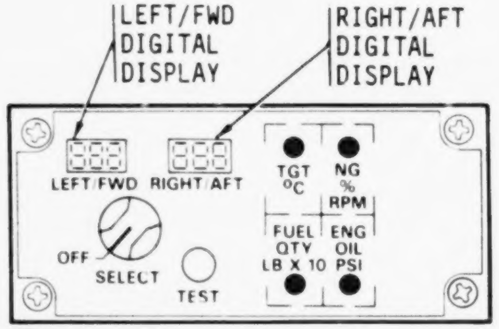
TORQUE
%
130
120
110
100
90
70
50
30
0
C S
C S
888 888
1
2
TORQUE VERTICAL SCALE ENGINE 2
TORQUE DIGITAL DISPLAY ENGINE 2

J TORQUE INDICATOR (TYPICAL)



ENG OIL
PSI X 10
18
14
10
6
3
2
0
ENG OIL SCALE DISPLAY ENGINE 2

K ENG OIL INDICATOR



LEFT/FWD DIGITAL DISPLAY
RIGHT/AFT DIGITAL DISPLAY
LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST

O CPG SELECTABLE DIGITAL DISPLAY

MM04/1-1142-4 A

GO TO NEXT PAGE

4-2-2. POWER PLANTS - OPERATIONAL CHECK (ENGINE 2) (cont)

TASK	RESULT
12. Move engine **NO. 2 PWR** lever to **OFF**. Place engine **NO. 2** start switch to **IGN OVRD**. Check cockpit ECS outlets for loss of air flow and that engine 2 accelerates to and remains between **23** percent and **25** percent N_G. After 30 seconds place engine **NO. 2** start switch to **OFF**.	If engine 2 does not accelerate to or remain between **23** percent and **25** percent N_G, go to para 4-2-22. If air flow from ECS outlets does not stop, go to para 4-2-42.

NOTE

- If Step 12 was successfully performed using External Power - Pressurized Air, go to Step 12.1.
- If Step 12 was successfully performed using on-board IPAS, go to Step 13.

TASK	RESULT
12.1 Start and operate APU (TM 55-1520-238-CL).	
12.2 Remove External Power-Pressurized Air, only (TM 55-1520-238-23).	
12.3 Repeat Step 12.	If engine 2 does not accelerate to or remain between **23** percent and **25** percent N_G, refer to Chapter 7 to troubleshoot Pressurized Air System.

CAUTION

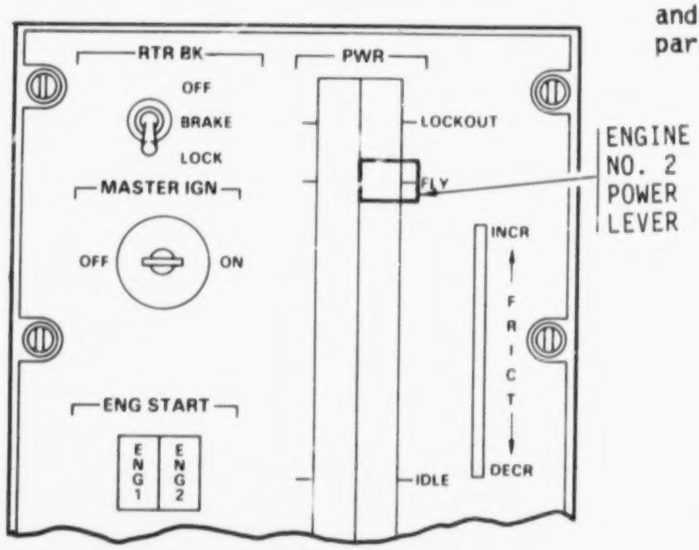
If engine overtemperature or hang start occurs or **ENG 2** start indicator remains lighted above **52** percent N_G, shut down engine 2. If positive oil pressure does not occur within 30 seconds after N_G begins to increase, shut down engine 2.

TASK	RESULT
13. Start engine 2 (TM 55-1520-238-CL).	If engine 2 does not start, go to para 4-2-36. If engine 2 starts, then flames out, and fuel crossfeed/shutoff valve indicator is at **NORMAL**, refer to chapter 10 to troubleshoot fuel system. If hang start occurs (**TGT** increases, but N_G does not reach idle speed), refer to TM 55-2840-248-23 to troubleshoot engine. If pilot **ENG OIL** indicator does not indicate positive oil pressure within 30 seconds of N_G increase, refer to chapter 8 to troubleshoot engine instruments. If **TGT** indicator exceeds **867** °C (1560 °F) during start, refer to TM 55-1520-248-23 to troubleshoot engine. If CPG selectable digital display panel, N_G, **TGT**, **ENG-RTR**, **TORQUE** or **ENG OIL** indicators do not indicate, refer to chapter 8 to troubleshoot engine instruments.
13.1 Check that **ENG START NO. 2** indicator is not lighted when N_G is greater than **52** percent.	If **ENG START NO. 2** indicator does not light, go to para 4-2-24. If **ENG START NO. 2** indicator remains lighted above **52** percent N_G, go to para 4-2-25.
13.2 Check that **ENGINE 2 OUT** indicators on pilot and CPG master caution/warning panels are not lighted.	If **ENGINE 2 OUT** indicators are lighted, go to para 4-2-26.
13.3 Check that **ENG START** circuit breaker stays closed.	If **ENG START** circuit breaker does not stay closed, go to para 4-2-23.

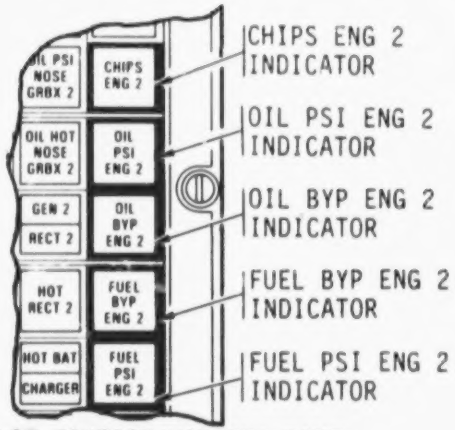
GO TO NEXT PAGE

4-2-2. POWER PLANTS - OPERATIONAL CHECK (ENGINE 2) (cont)

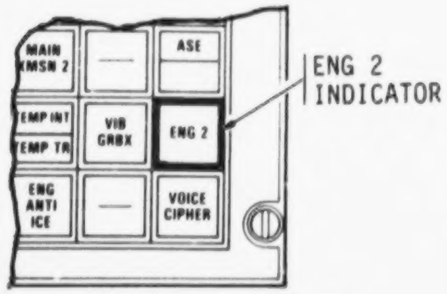
TASK	RESULT
14. Move engine **NO. 2 PWR** lever to **FLY**. On engine overspeed test panel, place **CKT A** switch to **ENG 2**. Check that engine 2 N_G remains stable and release **CKT A** switch. Place **CKT B** switch to **ENG 2**. Check that engine 2 N_G remains stable and **EMERG PWR** indicator is lighted. Release **CKT B** switch. Place **CKT A** and **CKT B** switches to **ENG 2** and check for a drop in engine 2 N_G. Release switches.	If N_G does not remain stable with **CKT A** switch closed, go to para 4-2-27. If N_G does not remain stable with **CKT B** switch closed, go to para 4-2-28. If **EMERG PWR** indicator is not lighted with **CKT B** switch closed, go to para 4-2-40. If N_G does not decrease with **CKT A** and **CKT B** switches closed, go to para 4-2-29. If engine 2 does not relight with **CKT A** and **CKT B** switches released, go to para 4-2-46.


RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
PWR
LOCKOUT
FLY
IDLE
INCR
FRICT
DECR
ENGINE NO. 2 POWER LEVER

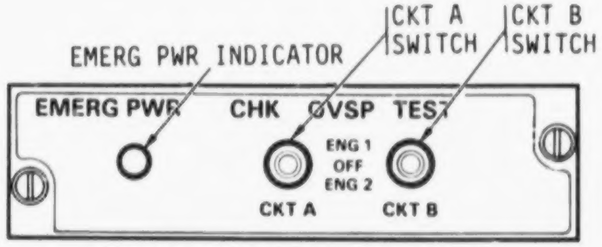
P/O PILOT POWER QUADRANT


OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
GEN 2
RECT 2
OIL BYP ENG 2
HOT RECT 2
FUEL BYP ENG 2
HOT BAT CHARGER
FUEL PSI ENG 2
CHIPS ENG 2 INDICATOR
OIL PSI ENG 2 INDICATOR
OIL BYP ENG 2 INDICATOR
FUEL BYP ENG 2 INDICATOR
FUEL PSI ENG 2 INDICATOR

P/O PILOT CAUTION/WARNING PANEL


MAIN XMSN 2
ASE
TEMP INT
TEMP TR
VIB GRBX
ENG 2
ENG ANTI ICE
VOICE CIPHER
ENG 2 INDICATOR

P/O CPG CAUTION/WARNING PANEL


EMERG PWR INDICATOR
CKT A SWITCH
CKT B SWITCH
EMERG PWR
CHK OVSP TEST
ENG 1
OFF
ENG 2
CKT A
CKT B

ENGINE OVERSPEED TEST PANEL

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TASK	RESULT
15. Check that the following indicators on the pilot caution/warning panel are not lighted: **CHIPS ENG 2** **OIL PSI ENG 2** **OIL BYP ENG 2** **FUEL PSI ENG 2** **FUEL BYP ENG 2**	If **OIL PSI ENG 2** indicator is lighted, go to para 4-2-38. If **CHIPS ENG 2** indicator is lighted, check for metal chips on chip detector (TM 55-2840-248-23). If chips are not present, go to para 4-2-30. If **OIL BYP ENG 2** indicator is lighted, check for clogged oil filter (TM 55-1520-248-23). If filter is not clogged, go to para 4-2-31. If **FUEL BYP ENG 2** indicator is lighted, check for clogged fuel filter (TM 55-1520-248-23). If filter is not clogged, go to para 4-2-32. If **FUEL PSI ENG 2** indicator is lighted, go to para 4-2-33.
16. On CPG caution/warning panel, check that **ENG 2** indicator is not lighted.	If **ENG 2** indicator on CPG caution/warning panel is lighted, refer to chapter 9 to troubleshoot CPG caution/warning system.
17. Move pilot engine **NO. 2 PWR** lever to **LOCKOUT**, and at first indication of N_G, N_r, or N_p increase, immediately move engine **NO. 2 PWR** lever back to a position midway between **FLY** and **IDLE**. Check that N_G, N_r, and N_p decrease and stabilize. Move engine **NO. 2 PWR** lever to **IDLE**, then to **FLY**.	If N_G, N_r or N_p do not increase or are fluctuating, refer to TM 55-2840-248-23 to troubleshoot engines. If N_p fluctuates refer to TM 55-1520-238-23 to adjust No. 2 engine turbine speed control unit.
18. Repeat step 17 above using CPG engine **NO. 2 PWR** lever.	If CPG **NO. 2 PWR** lever cannot be advanced to **LOCKOUT**, go to para 4-2-34.

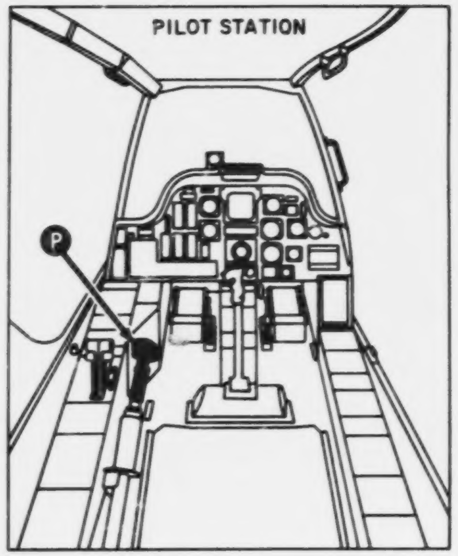
GO TO NEXT PAGE

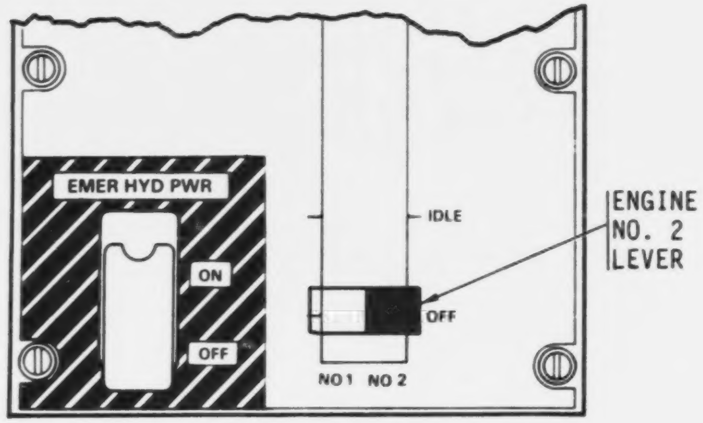
4-2-2. POWER PLANTS - OPERATIONAL CHECK (ENGINE 2) (cont)

	TASK	RESULT
19.	Push forward and turn pilot collective stick chop collar clockwise until **ENGINE CHOP** indicator lights. Release chop collar. Check that engine 2 N_G stabilizes at **IDLE**. Move engine **NO. 2 PWR** lever to **IDLE**. Push forward and turn pilot engine chop collar counterclockwise until **ENGINE CHOP** indicator goes out. Release chop collar. Check that N_G, TGT, and N_P are stabilized. Move engine **NO. 2 PWR** lever to **FLY**.	If pilot **ENGINE CHOP** indicator does not light, go to para 4-2-18. If engine 2 N_G does not decrease to and stabilize at **IDLE**, replace engine No. 2 chop relay (TM 55-1520-238-23). If **NO. 2 PWR** lever is advanced to **FLY** and engine 2 does not accelerate, go to para 4-2-19. If pilot **ENGINE CHOP** indicator does not go out, refer to chapter 9 to troubleshoot pilot caution/warning system.
20.	Repeat step 19 using CPG collective stick chop collar and engine **NO. 2 PWR** lever.	If CPG **ENGINE CHOP** indicator does not light, go to para 4-2-20. If engine 2 N_G does not decrease to and stabilize at idle, replace engine No. 2 chop relay (TM 55-1520-238-23). If CPG **ENGINE CHOP** indicator does not go out, refer to chapter 9 to troubleshoot CPG caution/warning system. If **NO. 2 PWR** lever is advanced to **FLY** and engine 2 does not accelerate, go to para 4-2-21.

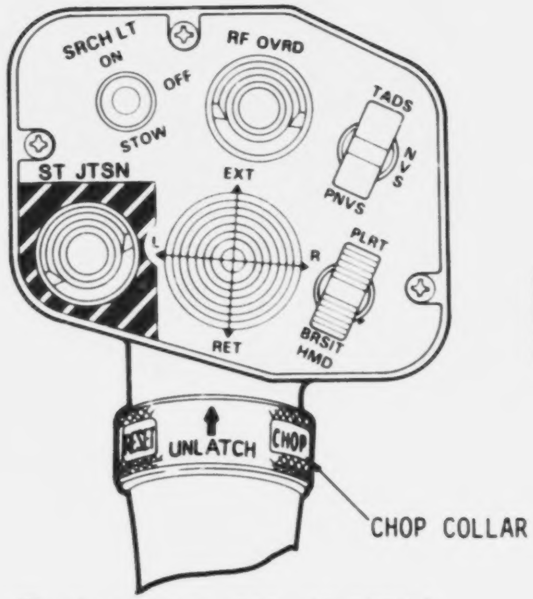
B. Perform POWER PLANTS - POWER DOWN (para 4-1-3).

C. Perform maintenance test flight (TM 55-1520-238-MTF).

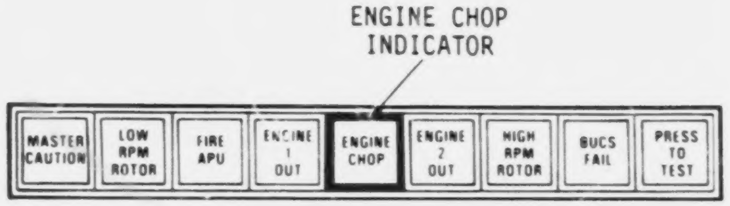

PILOT STATION
P


EMER HYD PWR
ON
OFF
IDLE
OFF
NO 1
NO 2
ENGINE NO. 2 LEVER

CPG POWER QUADRANT


SRCH LT
ON
OFF
STOW
RF OVRD
TADS
NVS
PNVS
ST JTSN
EXT
L
R
RET
PLRT
BRSIT
HMD
RESET
UNLATCH
CHOP
CHOP COLLAR

P COLLECTIVE STICK (TYPICAL)


ENGINE CHOP INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL (TYPICAL)

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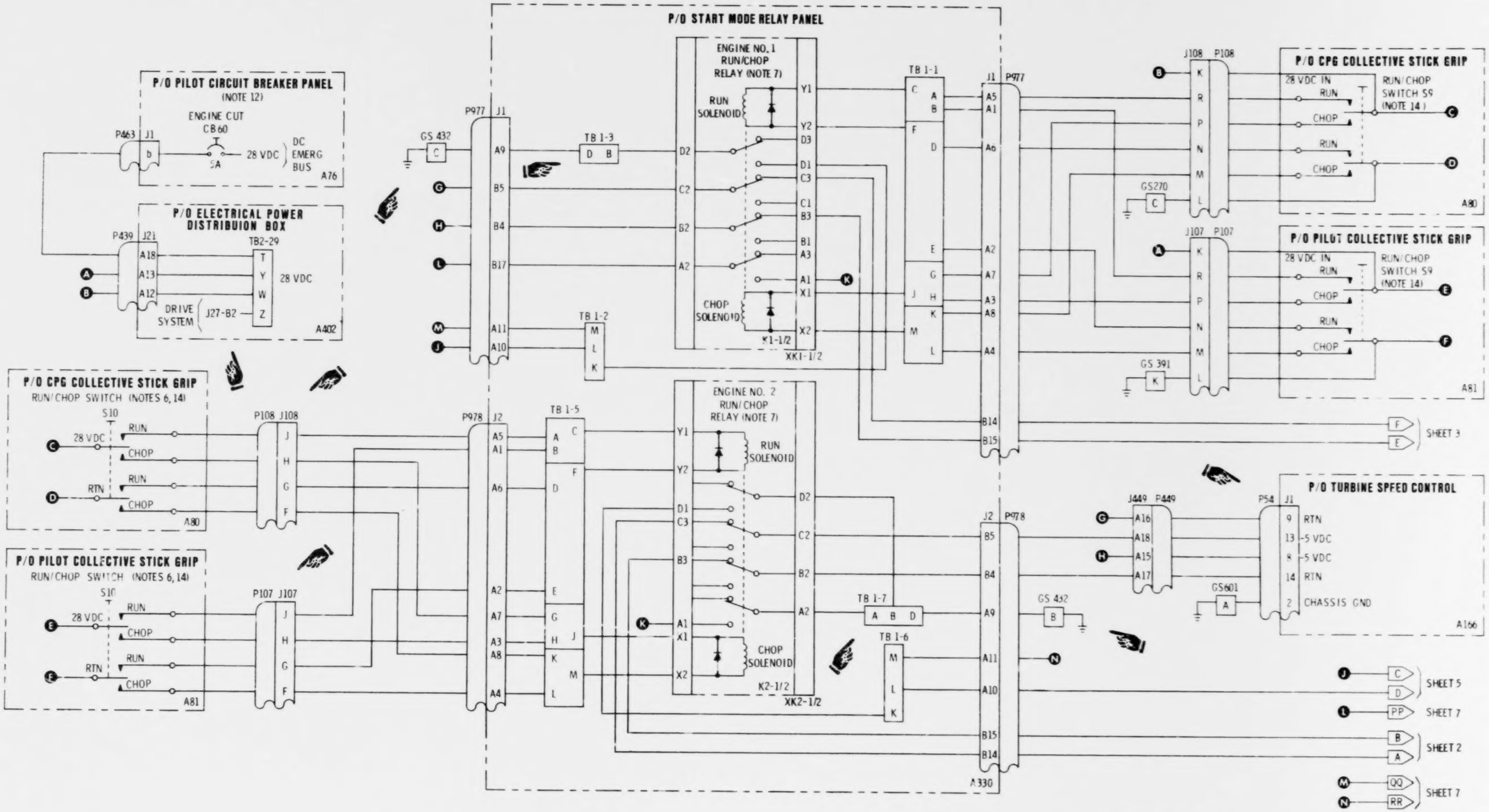
END OF TASK

4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM

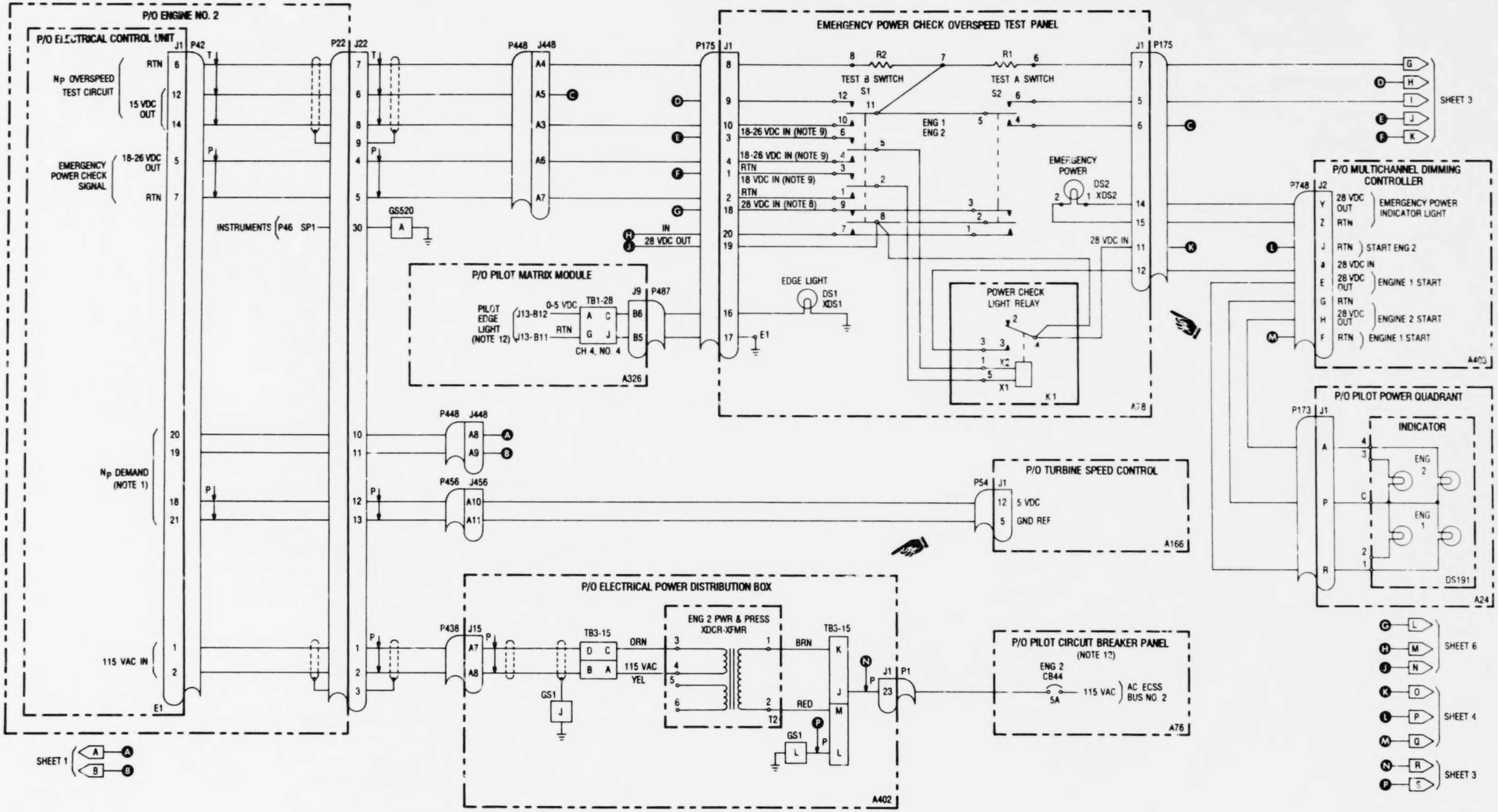

P/O START MODE RELAY PANEL
ENGINE NO. 1 RUN/CHOP RELAY (NOTE 7)
RUN SOLENOID
CHOP SOLENOID
K1-1/2
XK1-1/2
ENGINE NO. 2 RUN/CHOP RELAY (NOTE 7)
K2-1/2
XK2-1/2
P/O PILOT CIRCUIT BREAKER PANEL (NOTE 12)
ENGINE CUT CB60
5A
28 VDC
DC EMERG BUS
A76
P463 J1
P/O ELECTRICAL POWER DISTRIBUION BOX
P439 J21
TB2-29
DRIVE SYSTEM
J27-B2
A402
P/O CPG COLLECTIVE STICK GRIP
RUN/CHOP SWITCH (NOTES 6, 14)
S10
RUN
CHOP
28 VDC
RTN
A80
P/O PILOT COLLECTIVE STICK GRIP
RUN/CHOP SWITCH (NOTES 6, 14)
A81
P108 J108
P107 J107
P977 J1
P978 J2
GS 432
TB 1-1
TB 1-2
TB 1-3
TB 1-5
TB 1-6
TB 1-7
A330
J108 P108
J107 P107
GS270
GS 391
P/O CPG COLLECTIVE STICK GRIP
28 VDC IN
RUN/CHOP SWITCH S9 (NOTE 14)
A80
P/O PILOT COLLECTIVE STICK GRIP
RUN/CHOP SWITCH S9 (NOTE 14)
A81
SHEET 3
P/O TURBINE SPEED CONTROL
J449 P449
P54 J1
GS601
9 RTN
13 -5 VDC
8 -5 VDC
14 RTN
2 CHASSIS GND
A166
SHEET 5
SHEET 7
SHEET 2
SHEET 7

FOR NOTES, SEE SHEET 3.

SHEET 1 OF 8

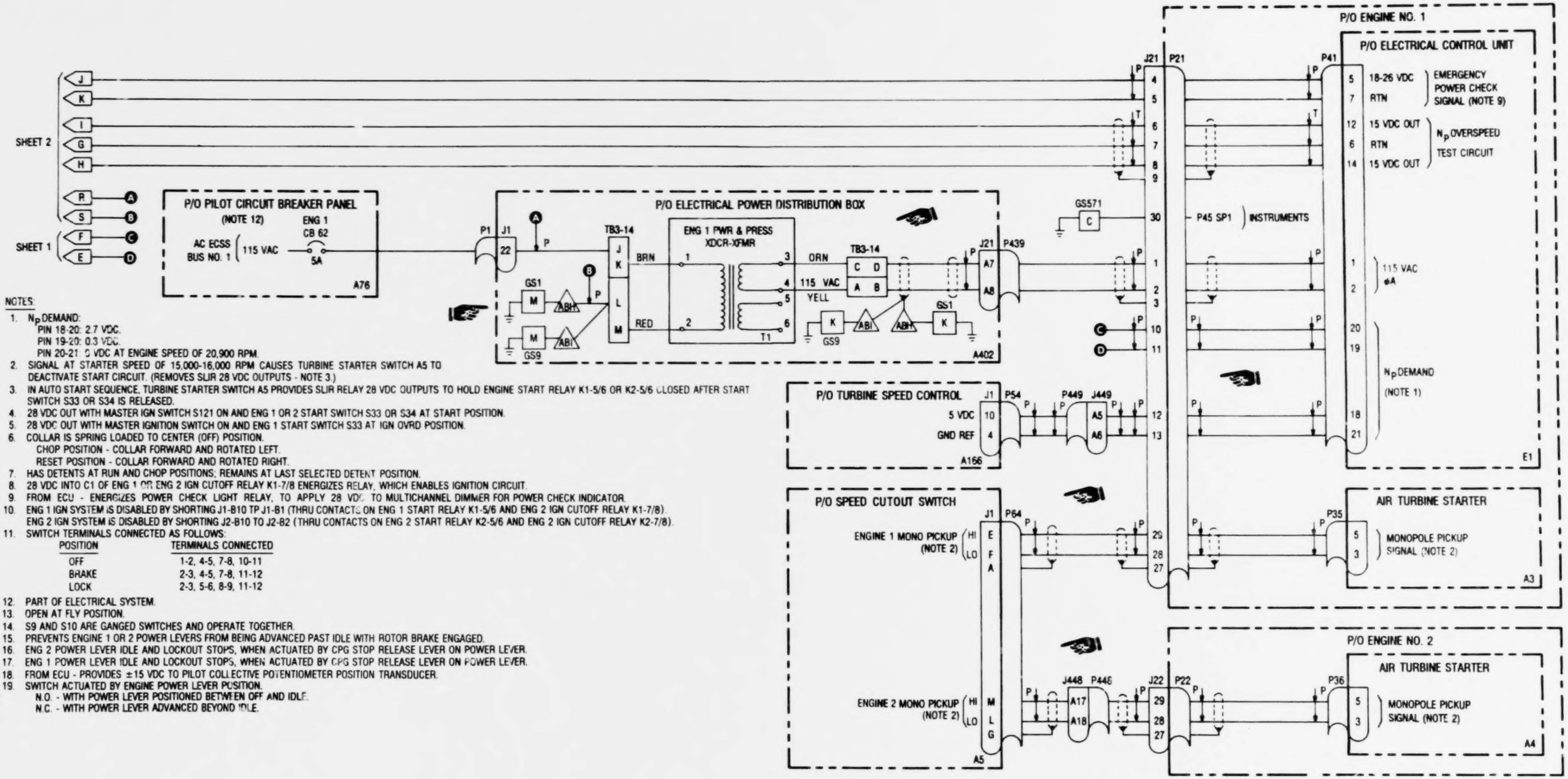
MM04/1-969-1C

4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM (cont)


P/O ENGINE NO. 2
P/O ELECTRICAL CONTROL UNIT
J1 P42
Np OVERSPEED TEST CIRCUIT
RTN
15 VDC OUT
EMERGENCY POWER CHECK SIGNAL
18-26 VDC OUT
Np DEMAND (NOTE 1)
115 VAC IN
E1
P22 J22
P448 J448
INSTRUMENTS P46 SP1
GS520
P/O PILOT MATRIX MODULE
PILOT EDGE LIGHT (NOTE 12)
J13-B12
J13-B11
0-5 VDC
TB1-28
CH 4, NO. 4
J9 P487
A326
EMERGENCY POWER CHECK OVERSPEED TEST PANEL
P175 J1
TEST B SWITCH S1
TEST A SWITCH S2
R1
R2
ENG 1
ENG 2
18-26 VDC IN (NOTE 9)
18 VDC IN (NOTE 9)
28 VDC IN (NOTE 8)
IN
28 VDC OUT
EMERGENCY POWER
DS2 XDS2
28 VDC IN
EDGE LIGHT
DS1 XDS1
POWER CHECK LIGHT RELAY
K1
A78
P/O MULTICHANNEL DIMMING CONTROLLER
P748 J2
EMERGENCY POWER INDICATOR LIGHT
START ENG 2
28 VDC IN
ENGINE 1 START
ENGINE 2 START
A403
P/O PILOT POWER QUADRANT
P173 J1
INDICATOR
ENG 2
ENG 1
DS191
A24
P456 J456
P54 J1
P/O TURBINE SPEED CONTROL
5 VDC
GND REF
A166
P/O ELECTRICAL POWER DISTRIBUTION BOX
P438 J15
TB3-15
ENG 2 PWR & PRESS XDCR-XFMR
ORN
115 VAC
YEL
BRN
RED
T2
GS1
J1 P1
A402
P/O PILOT CIRCUIT BREAKER PANEL (NOTE 12)
ENG 2 CB44
5A
115 VAC
AC ECSS BUS NO. 2
A76
SHEET 1
SHEET 3
SHEET 6
SHEET 4
SHEET 3

SHEET 2 OF 8 MM04/1-969-2H

4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM (cont)


SHEET 2
J
K
I
G
H
R
S
SHEET 1
F
E
A
B
C
D
P/O PILOT CIRCUIT BREAKER PANEL
(NOTE 12)
AC ECSS BUS NO. 1
115 VAC
ENG 1 CB 62
5A
A76
P1
J1
22
P/O ELECTRICAL POWER DISTRIBUTION BOX
TB3-14
J
K
L
M
BRN
RED
GS1
GS9
M
ABH
ABI
ENG 1 PWR & PRESS XDCR-XFMR
T1
ORN
115 VAC
YELL
TB3-14
C D
A B
K
J21
P439
A7
A8
A402
GS571
C
P45 SP1
INSTRUMENTS
P/O TURBINE SPEED CONTROL
5 VDC
GND REF
J1
P54
P449
J449
A5
A6
A166
P/O SPEED CUTOUT SWITCH
ENGINE 1 MONO PICKUP (NOTE 2)
HI
LO
ENGINE 2 MONO PICKUP (NOTE 2)
J1
P64
E
F
A
M
L
G
A5
J448
P446
A17
A18
J22
P22
P/O ENGINE NO. 1
P/O ELECTRICAL CONTROL UNIT
J21
P21
P41
18-26 VDC
RTN
EMERGENCY POWER CHECK SIGNAL (NOTE 9)
15 VDC OUT
RTN
15 VDC OUT
N_P OVERSPEED TEST CIRCUIT
115 VAC φA
N_P DEMAND (NOTE 1)
E1
AIR TURBINE STARTER
P35
MONOPOLE PICKUP SIGNAL (NOTE 2)
A3
P/O ENGINE NO. 2
AIR TURBINE STARTER
P36
MONOPOLE PICKUP SIGNAL (NOTE 2)
A4
P
T

NOTES:

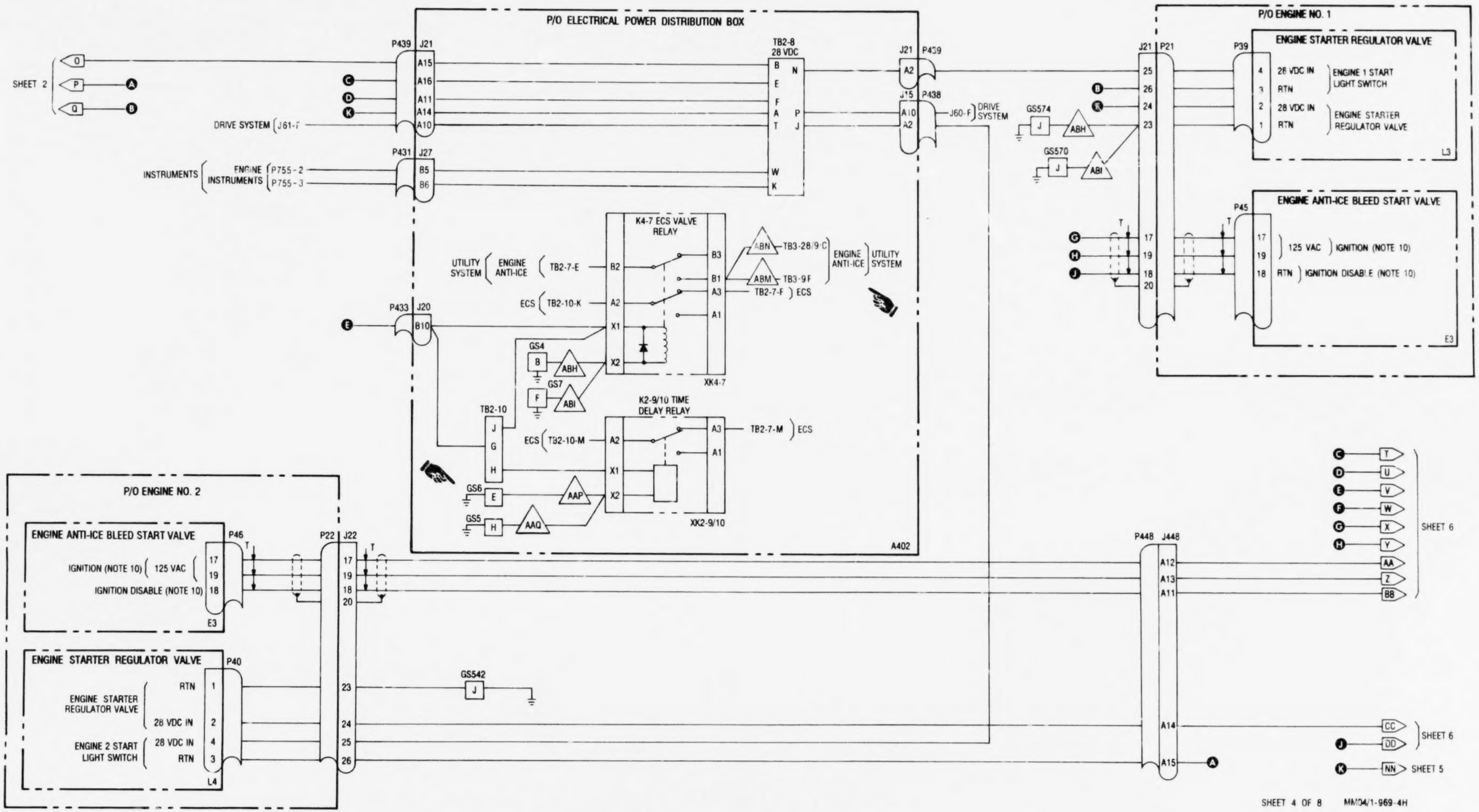
1. N_P DEMAND:
   PIN 18-20: 2.7 VDC.
   PIN 19-20: 0.3 VDC.
   PIN 20-21: 0 VDC AT ENGINE SPEED OF 20,900 RPM.
2. SIGNAL AT STARTER SPEED OF 15,000-16,000 RPM CAUSES TURBINE STARTER SWITCH A5 TO DEACTIVATE START CIRCUIT. (REMOVES SLIR 28 VDC OUTPUTS - NOTE 3.)
3. IN AUTO START SEQUENCE, TURBINE STARTER SWITCH A5 PROVIDES SLIR RELAY 28 VDC OUTPUTS TO HOLD ENGINE START RELAY K1-5/6 OR K2-5/6 CLOSED AFTER START SWITCH S33 OR S34 IS RELEASED.
4. 28 VDC OUT WITH MASTER IGN SWITCH S121 ON AND ENG 1 OR 2 START SWITCH S33 OR S34 AT START POSITION.
5. 28 VDC OUT WITH MASTER IGNITION SWITCH ON AND ENG 1 START SWITCH S33 AT IGN OVRD POSITION.
6. COLLAR IS SPRING LOADED TO CENTER (OFF) POSITION.
   CHOP POSITION - COLLAR FORWARD AND ROTATED LEFT.
   RESET POSITION - COLLAR FORWARD AND ROTATED RIGHT.
7. HAS DETENTS AT RUN AND CHOP POSITIONS; REMAINS AT LAST SELECTED DETENT POSITION.
8. 28 VDC INTO C1 OF ENG 1 OR ENG 2 IGN CUTOFF RELAY K1-7/8 ENERGIZES RELAY, WHICH ENABLES IGNITION CIRCUIT.
9. FROM ECU - ENERGIZES POWER CHECK LIGHT RELAY, TO APPLY 28 VDC TO MULTICHANNEL DIMMER FOR POWER CHECK INDICATOR.
10. ENG 1 IGN SYSTEM IS DISABLED BY SHORTING J1-B10 TP J1-B1 (THRU CONTACTS ON ENG 1 START RELAY K1-5/6 AND ENG 2 IGN CUTOFF RELAY K1-7/8).
    ENG 2 IGN SYSTEM IS DISABLED BY SHORTING J2-B10 TO J2-B2 (THRU CONTACTS ON ENG 2 START RELAY K2-5/6 AND ENG 2 IGN CUTOFF RELAY K2-7/8).
11. SWITCH TERMINALS CONNECTED AS FOLLOWS:

POSITION	TERMINALS CONNECTED
OFF	1-2, 4-5, 7-8, 10-11
BRAKE	2-3, 4-5, 7-8, 11-12
LOCK	2-3, 5-6, 8-9, 11-12

12. PART OF ELECTRICAL SYSTEM.
13. OPEN AT FLY POSITION.
14. S9 AND S10 ARE GANGED SWITCHES AND OPERATE TOGETHER.
15. PREVENTS ENGINE 1 OR 2 POWER LEVERS FROM BEING ADVANCED PAST IDLE WITH ROTOR BRAKE ENGAGED.
16. ENG 2 POWER LEVER IDLE AND LOCKOUT STOPS, WHEN ACTUATED BY CPG STOP RELEASE LEVER ON POWER LEVER.
17. ENG 1 POWER LEVER IDLE AND LOCKOUT STOPS, WHEN ACTUATED BY CPG STOP RELEASE LEVER ON POWER LEVER.
18. FROM ECU - PROVIDES ±15 VDC TO PILOT COLLECTIVE POTENTIOMETER POSITION TRANSDUCER.
19. SWITCH ACTUATED BY ENGINE POWER LEVER POSITION.
    N.O. - WITH POWER LEVER POSITIONED BETWEEN OFF AND IDLE.
    N.C. - WITH POWER LEVER ADVANCED BEYOND IDLE.

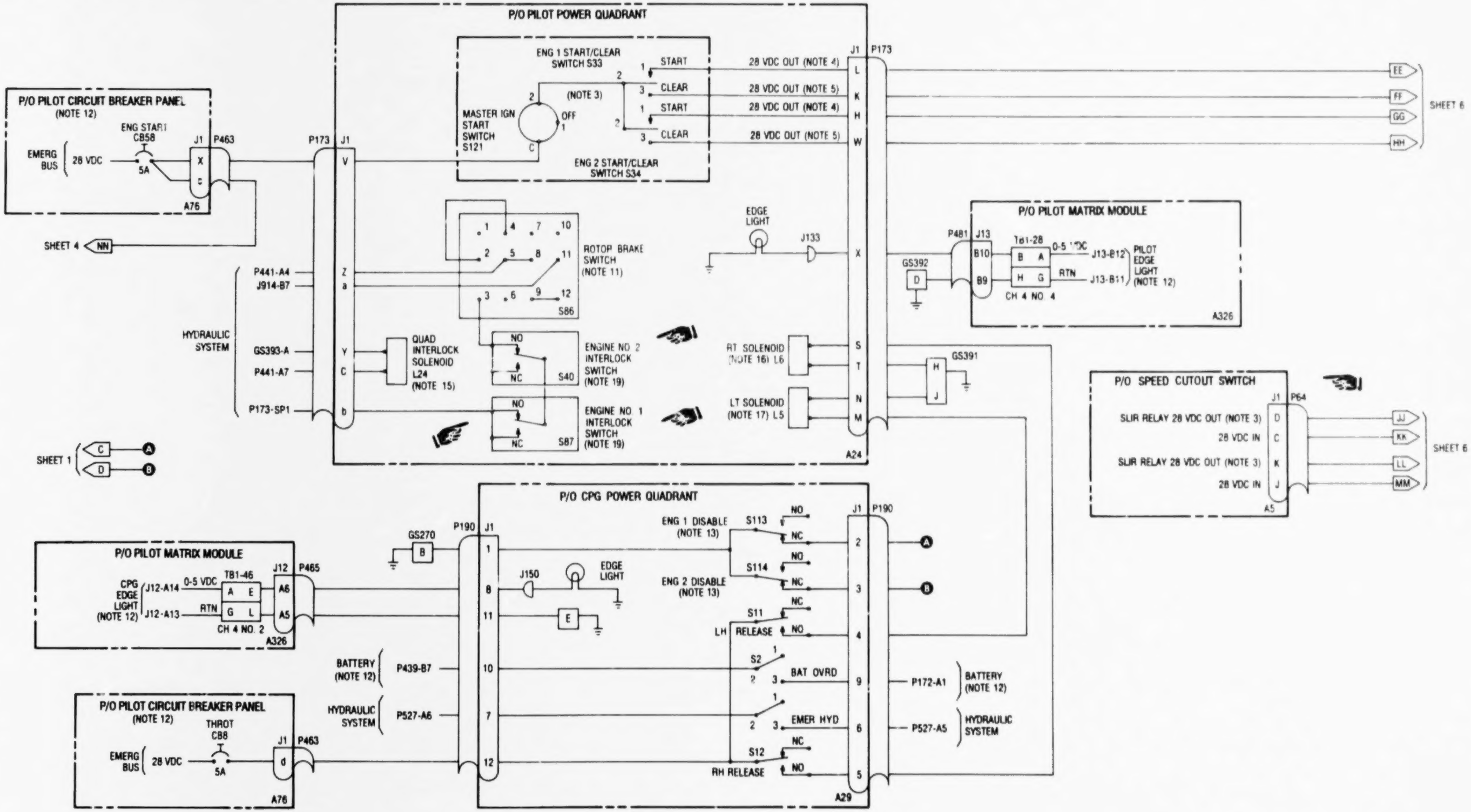
SHEET 3 OF 8 MM04/1-969-31

4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM (cont)


P/O ELECTRICAL POWER DISTRIBUTION BOX
SHEET 2
O
P
Q
A
B
C
D
K
E
DRIVE SYSTEM (J61-F
INSTRUMENTS
ENGINE INSTRUMENTS
P755-2
P755-3
P439
J21
A15
A16
A11
A14
A10
P431
J27
B5
B6
TB2-8
28 VDC
N
P
J
W
K
J21
P439
A2
J15
P438
J60-F
DRIVE SYSTEM
GS574
GS570
ABH
ABI
K4-7 ECS VALVE RELAY
UTILITY SYSTEM
ENGINE ANTI-ICE
TB2-7-E
B2
B3
B1
A3
A1
ABN
ABM
TB3-28/9-C
TB3-9F
TB2-7-F
ECS
ENGINE ANTI-ICE
UTILITY SYSTEM
TB2-10-K
P433
J20
B10
X1
X2
GS4
GS7
XK4-7
TB2-10
K2-9/10 TIME DELAY RELAY
TB2-10-M
TB2-7-M
GS6
GS5
AAP
AAQ
XX2-9/10
A402
P/O ENGINE NO. 1
ENGINE STARTER REGULATOR VALVE
J21
P21
P39
28 VDC IN
RTN
ENGINE 1 START LIGHT SWITCH
ENGINE STARTER REGULATOR VALVE
L3
ENGINE ANTI-ICE BLEED START VALVE
P45
T
125 VAC
IGNITION (NOTE 10)
IGNITION DISABLE (NOTE 10)
E3
G
H
J
P/O ENGINE NO. 2
P46
P22
J22
ENGINE STARTER REGULATOR VALVE
P40
ENGINE 2 START LIGHT SWITCH
L4
GS542
P448
J448
A12
A13
A11
A14
A15
T
U
V
W
X
Y
AA
Z
BB
SHEET 6
CC
DD
NN
SHEET 5
F

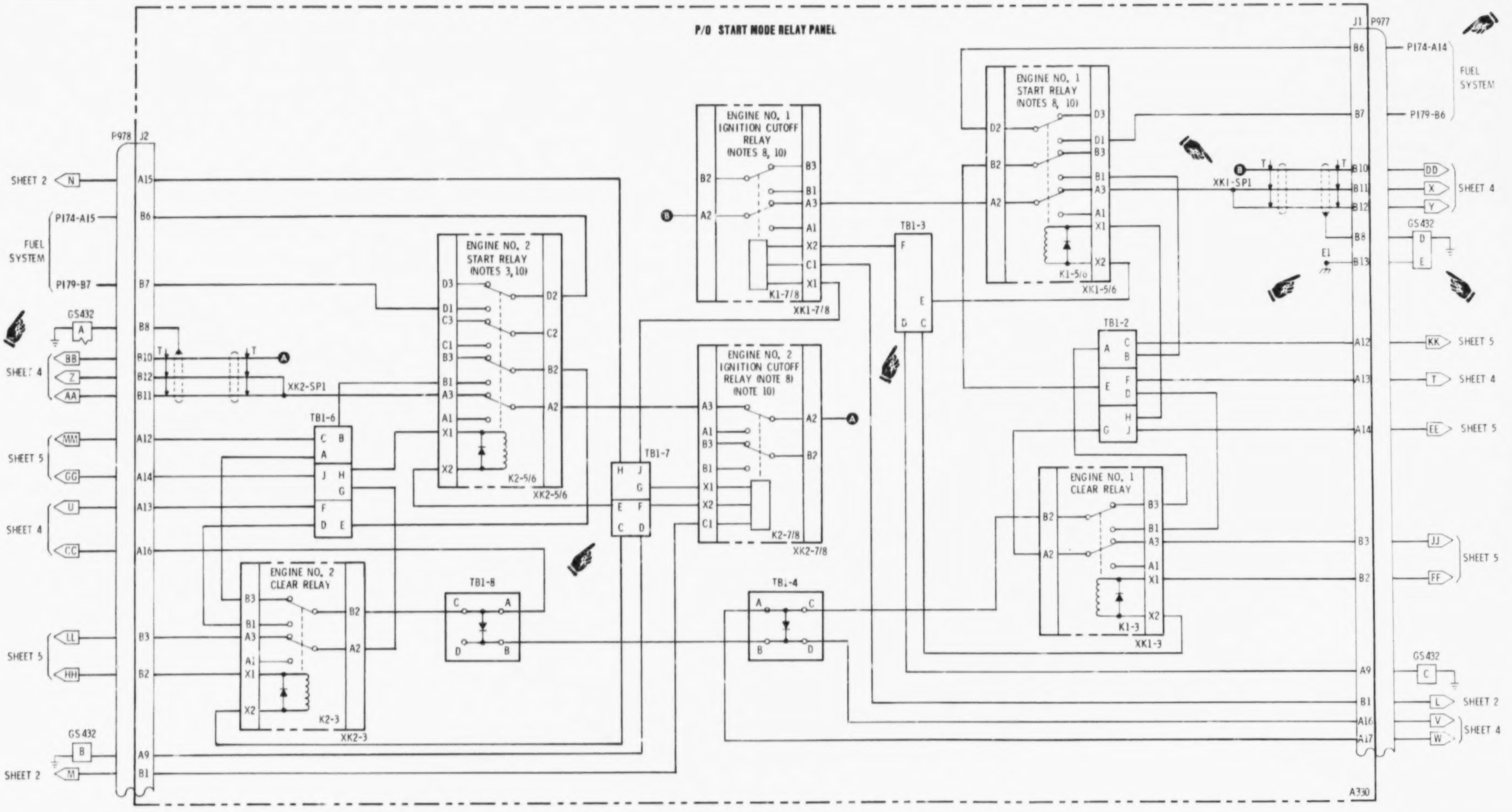
SHEET 4 OF 8 MM04/1-969-4H

4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM (cont)


P/O PILOT POWER QUADRANT
ENG 1 START/CLEAR SWITCH S33
START
CLEAR
START
CLEAR
(NOTE 3)
MASTER IGN START SWITCH S121
OFF
ENG 2 START/CLEAR SWITCH S34
28 VDC OUT (NOTE 4)
28 VDC OUT (NOTE 5)
28 VDC OUT (NOTE 4)
28 VDC OUT (NOTE 5)
J1
P173
EE
FF
GG
HH
SHEET 6
P/O PILOT CIRCUIT BREAKER PANEL (NOTE 12)
EMERG BUS
28 VDC
ENG START CB58
5A
J1
P463
A76
SHEET 4
NN
ROTOR BRAKE SWITCH (NOTE 11)
S86
EDGE LIGHT
J133
P441-A4
J914-B7
HYDRAULIC SYSTEM
GS393-A
P441-A7
P173-SP1
QUAD INTERLOCK SOLENOID L24 (NOTE 15)
ENGINE NO 2 INTERLOCK SWITCH (NOTE 19)
S40
ENGINE NO 1 INTERLOCK SWITCH (NOTE 19)
S87
NO
NC
RT SOLENOID (NOTE 16) L6
LT SOLENOID (NOTE 17) L5
A24
GS391
P/O PILOT MATRIX MODULE
P481
J13
GS392
TB1-28
0-5 VDC
RTN
J13-B12
J13-B11
PILOT EDGE LIGHT (NOTE 12)
CH 4 NO 4
A326
P/O SPEED CUTOUT SWITCH
P64
SLIR RELAY 28 VDC OUT (NOTE 3)
28 VDC IN
SLIR RELAY 28 VDC OUT (NOTE 3)
28 VDC IN
A5
JJ
KK
LL
MM
SHEET 6
SHEET 1
C
D
A
B
P/O CPG POWER QUADRANT
GS270
P190
J1
P/O PILOT MATRIX MODULE
CPG EDGE LIGHT (NOTE 12)
J12-A14
J12-A13
0-5 VDC
RTN
TB1-46
CH 4 NO. 2
J12
P465
A326
J150
EDGE LIGHT
ENG 1 DISABLE (NOTE 13)
S113
ENG 2 DISABLE (NOTE 13)
S114
S11
LH RELEASE
S2
BAT OVRD
EMER HYD
S12
RH RELEASE
BATTERY (NOTE 12)
P439-B7
HYDRAULIC SYSTEM
P527-A6
P172-A1
BATTERY (NOTE 12)
P527-A5
HYDRAULIC SYSTEM
A29
P/O PILOT CIRCUIT BREAKER PANEL (NOTE 12)
EMERG BUS
28 VDC
THROT CB8
5A
J1
P463
A76

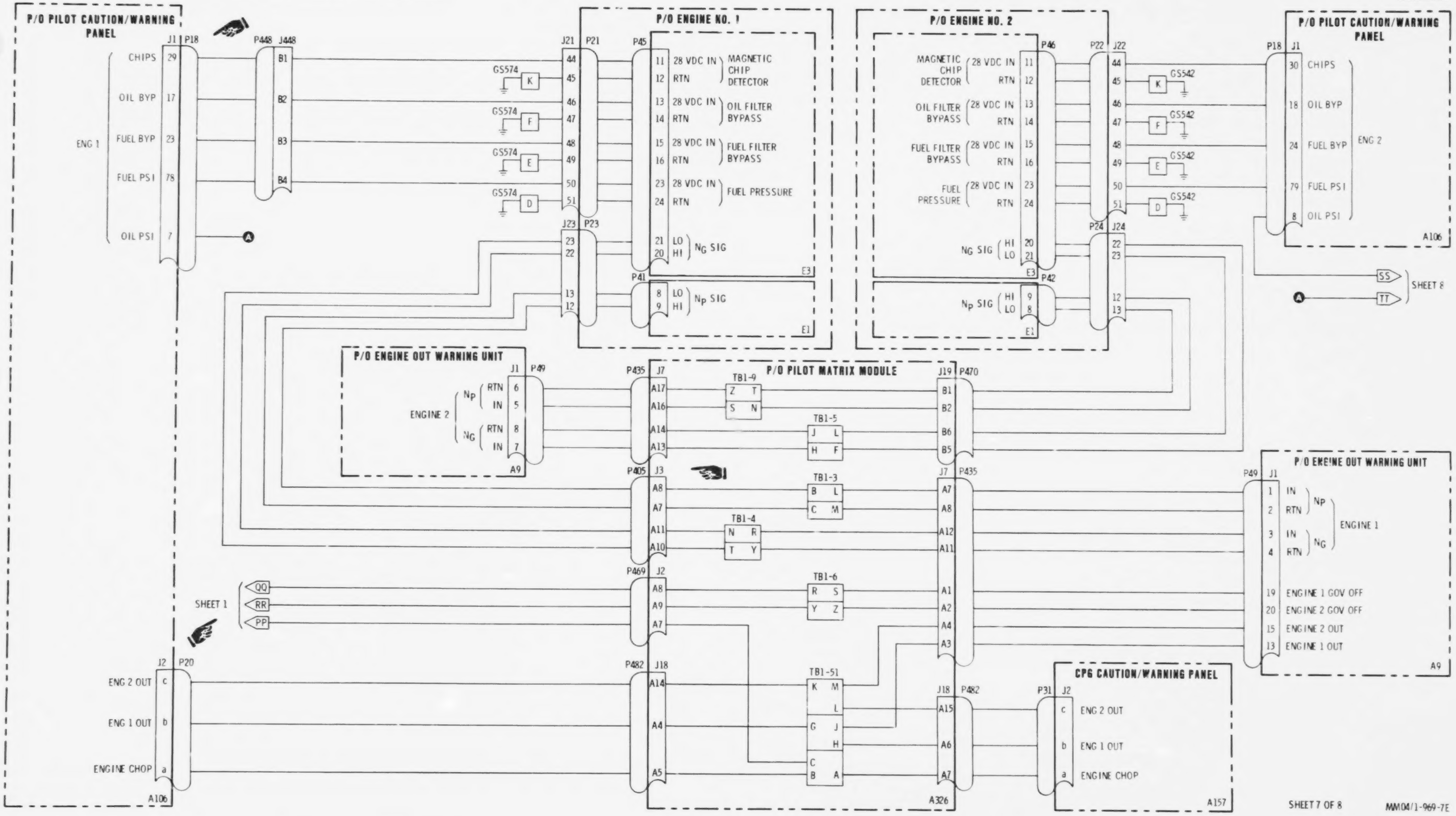
SHEET 5 OF 8 MM04/1-969-5D

4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM (cont)

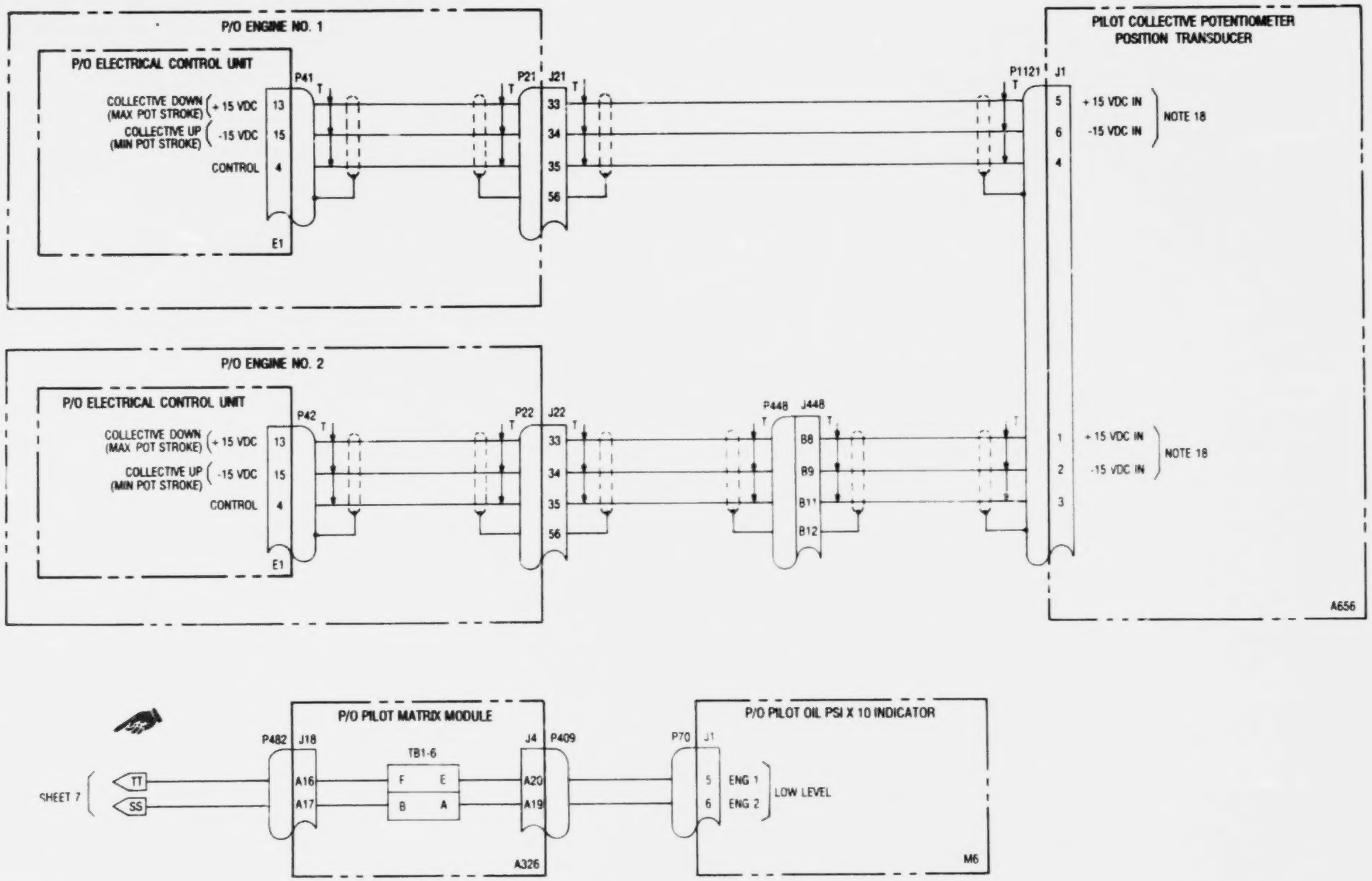

P/O START MODE RELAY PANEL
P978
J2
J1
P977
SHEET 2
N
FUEL SYSTEM
P174-A15
P179-B7
GS432
A
SHEET 4
BB
Z
AA
SHEET 5
MM
GG
U
CC
LL
HH
B
M
A15
B6
B7
B8
B10
B12
B11
A12
A14
A13
A16
B3
B2
A9
B1
XK2-SP1
T
ENGINE NO. 2 START RELAY (NOTES 3, 10)
D3
D1
C3
C1
B3
B1
A3
A1
X1
X2
D2
C2
B2
A2
K2-5/6
XK2-5/6
TB1-6
TB1-7
TB1-8
ENGINE NO. 2 CLEAR RELAY
K2-3
XK2-3
ENGINE NO. 1 IGNITION CUTOFF RELAY (NOTES 8, 10)
K1-7/8
XK1-7/8
ENGINE NO. 2 IGNITION CUTOFF RELAY (NOTE 8) (NOTE 10)
K2-7/8
XK2-7/8
TB1-3
TB1-4
ENGINE NO. 1 START RELAY (NOTES 8, 10)
K1-5/6
XK1-5/6
TB1-2
ENGINE NO. 1 CLEAR RELAY
K1-3
XK1-3
XK1-SP1
E1
P174-A14
P179-B6
B13
A17
DD
X
Y
KK
T
EE
JJ
FF
L
V
W
D
E
C
SHEET 2
SHEET 4
SHEET 5
A330

SHEET 6 OF 8   MM04/1-969-6C

4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM (cont)

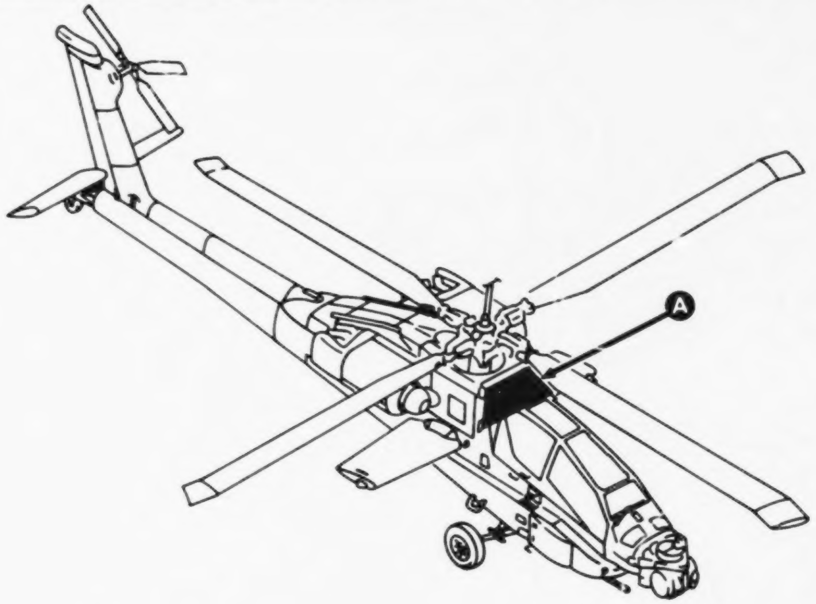

P/O PILOT CAUTION/WARNING PANEL
J1 P18
CHIPS 29
OIL BYP 17
ENG 1
FUEL BYP 23
FUEL PSI 78
OIL PSI 7
A
P448 J448
B1 B2 B3 B4
J21 P21
44 45 46 47 48 49 50 51
GS574 K
GS574 F
GS574 E
GS574 D
J23 P23
23 22 13 12
P/O ENGINE NO. 1
P45
11 28 VDC IN
12 RTN
MAGNETIC CHIP DETECTOR
13 28 VDC IN
14 RTN
OIL FILTER BYPASS
15 28 VDC IN
16 RTN
FUEL FILTER BYPASS
23 28 VDC IN
24 RTN
FUEL PRESSURE
21 LO
20 HI
N_G SIG
E3
P41
8 LO
9 HI
N_P SIG
E1
P/O ENGINE NO. 2
MAGNETIC CHIP DETECTOR
28 VDC IN 11
RTN 12
OIL FILTER BYPASS
28 VDC IN 13
RTN 14
FUEL FILTER BYPASS
28 VDC IN 15
RTN 16
FUEL PRESSURE
28 VDC IN 23
RTN 24
N_G SIG
HI 20
LO 21
E3
P42
N_P SIG
HI 9
LO 8
E1
P46
P22 J22
44 45 46 47 48 49 50 51
K GS542
F GS542
E GS542
D GS542
P24 J24
22 23 12 13
P/O PILOT CAUTION/WARNING PANEL
P18 J1
30 CHIPS
18 OIL BYP
24 FUEL BYP
ENG 2
79 FUEL PSI
8 OIL PSI
A106
SS
TT
SHEET 8
A
P/O ENGINE OUT WARNING UNIT
J1 P49
ENGINE 2
N_P RTN 6
IN 5
N_G RTN 8
IN 7
A9
P/O PILOT MATRIX MODULE
P435 J7
A17 A16 A14 A13
TB1-9
Z T
S N
TB1-5
J L
H F
J19 P470
B1 B2 B6 B5
P405 J3
A8 A7 A11 A10
TB1-3
B L
C M
TB1-4
N R
T Y
J7 P435
A7 A8 A12 A11
P469 J2
A8 A9 A7
QQ
RR
PP
SHEET 1
TB1-6
R S
Y Z
A1 A2 A4 A3
P/O ENGINE OUT WARNING UNIT
P49 J1
1 IN
2 RTN
N_P
3 IN
4 RTN
N_G
ENGINE 1
19 ENGINE 1 GOV OFF
20 ENGINE 2 GOV OFF
15 ENGINE 2 OUT
13 ENGINE 1 OUT
A9
J2 P20
ENG 2 OUT c
ENG 1 OUT b
ENGINE CHOP a
A106
P482 J18
A14 A4 A5
TB1-51
K M
L
G J
H
C
B A
J18 P482
A15 A6 A7
A326
CPG CAUTION/WARNING PANEL
P31 J2
c ENG 2 OUT
b ENG 1 OUT
a ENGINE CHOP
A157
SHEET 7 OF 8
MM04/1-969-7E

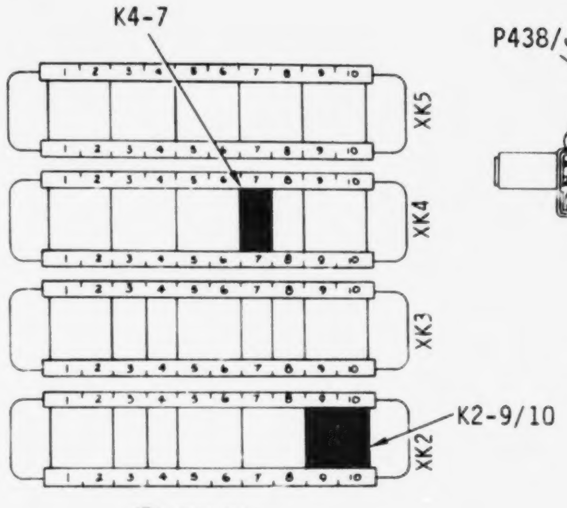
4-2-3. POWER PLANTS - INTERCONNECTION DIAGRAM (cont)


P/O ENGINE NO. 1
P/O ELECTRICAL CONTROL UNIT
COLLECTIVE DOWN (MAX POT STROKE)
+15 VDC
COLLECTIVE UP (MIN POT STROKE)
-15 VDC
CONTROL
P41
13
15
4
E1
T
P21
J21
33
34
35
56
P1121
J1
PILOT COLLECTIVE POTENTIOMETER POSITION TRANSDUCER
5
6
4
+15 VDC IN
-15 VDC IN
NOTE 18
P/O ENGINE NO. 2
P/O ELECTRICAL CONTROL UNIT
COLLECTIVE DOWN (MAX POT STROKE)
+15 VDC
COLLECTIVE UP (MIN POT STROKE)
-15 VDC
CONTROL
P42
13
15
4
E1
P22
J22
33
34
35
56
P448
J448
B8
B9
B11
B12
1
2
3
+15 VDC IN
-15 VDC IN
NOTE 18
A656
SHEET 7
TT
SS
P482
J18
A16
A17
P/O PILOT MATRIX MODULE
TB1-6
F
E
B
A
J4
P409
A20
A19
A326
P70
J1
P/O PILOT OIL PSI X 10 INDICATOR
5
6
ENG 1
ENG 2
LOW LEVEL
M6

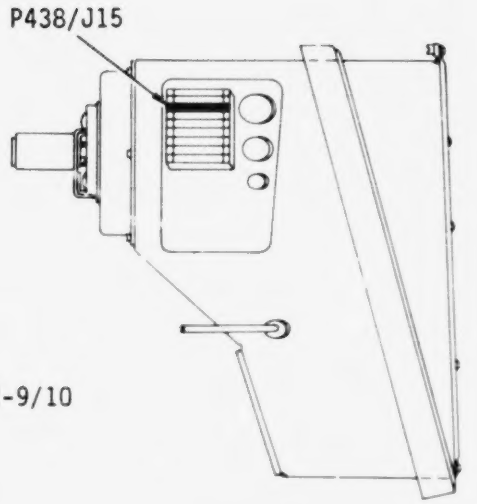
SHEET 8 OF 8 MM04/1-969-8F

4-2-4. POWER PLANTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION

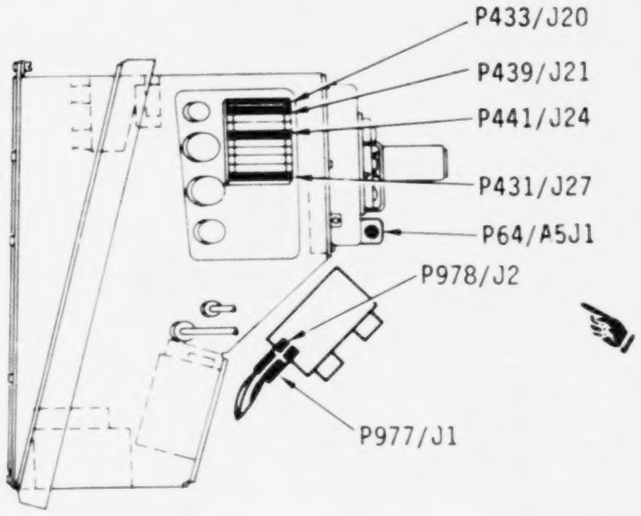



K4-7
XK5
XK4
XK3
XK2
K2-9/10

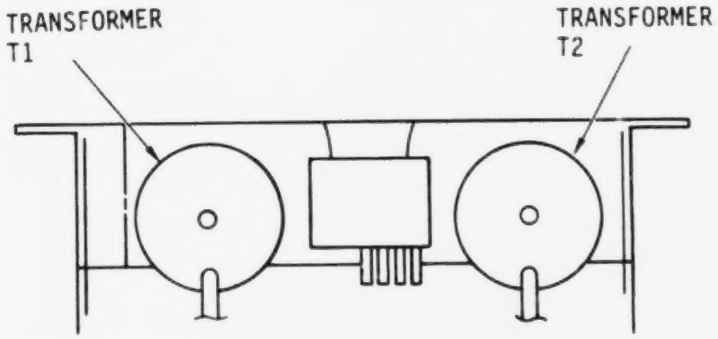
Ⓓ RELAYS



Ⓑ RIGHT SIDE VIEW (ROTATED)

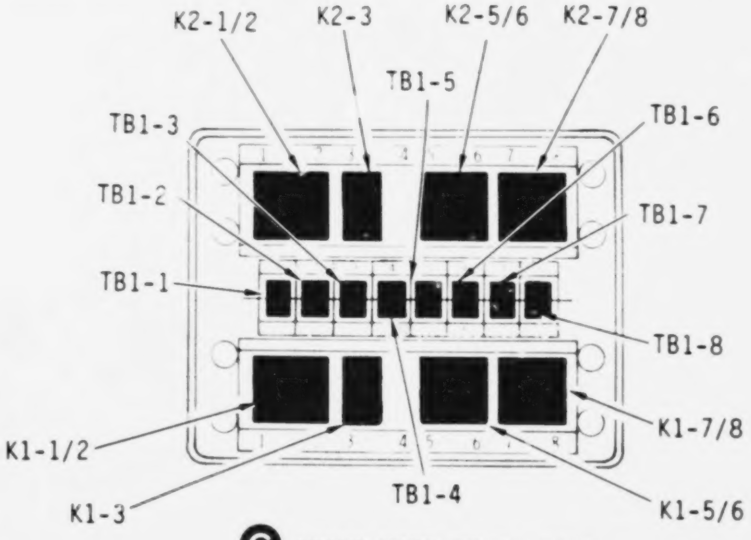

P433/J20
P439/J21
P441/J24
P431/J27
P64/A5J1
P978/J2
P977/J1

Ⓔ LEFT SIDE VIEW (ROTATED)

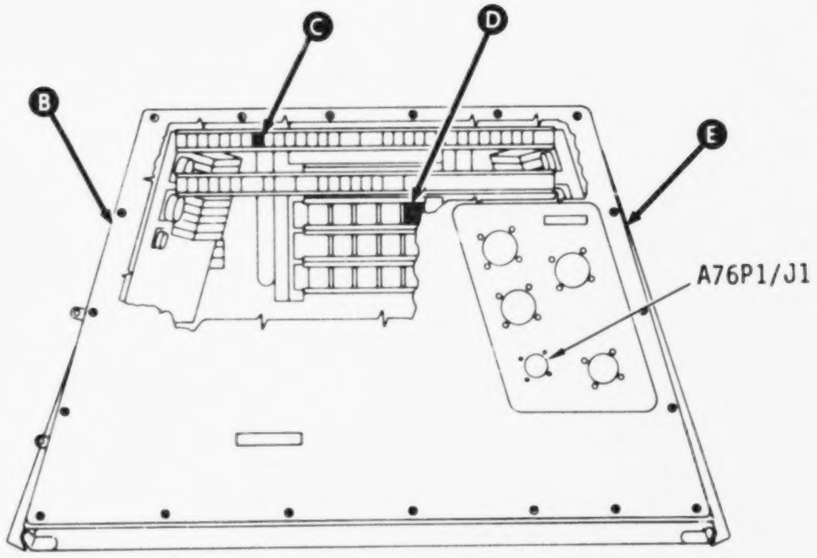

TRANSFORMER T1
TRANSFORMER T2

Ⓕ TRANSFORMERS

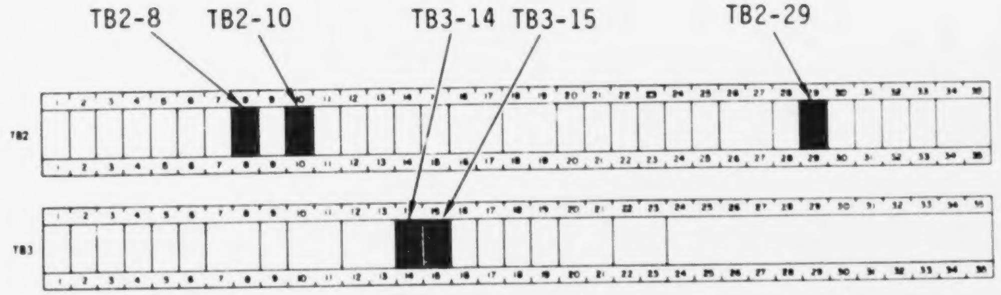
(NOTE: TB's MOUNTED INSIDE RELAY BOX)


K2-1/2
K2-3
K2-5/6
K2-7/8
TB1-5
TB1-3
TB1-6
TB1-2
TB1-7
TB1-1
TB1-8
K1-7/8
K1-1/2
K1-3
TB1-4
K1-5/6

Ⓖ START MODE RELAY PANEL


B
C
D
E
A76P1/J1

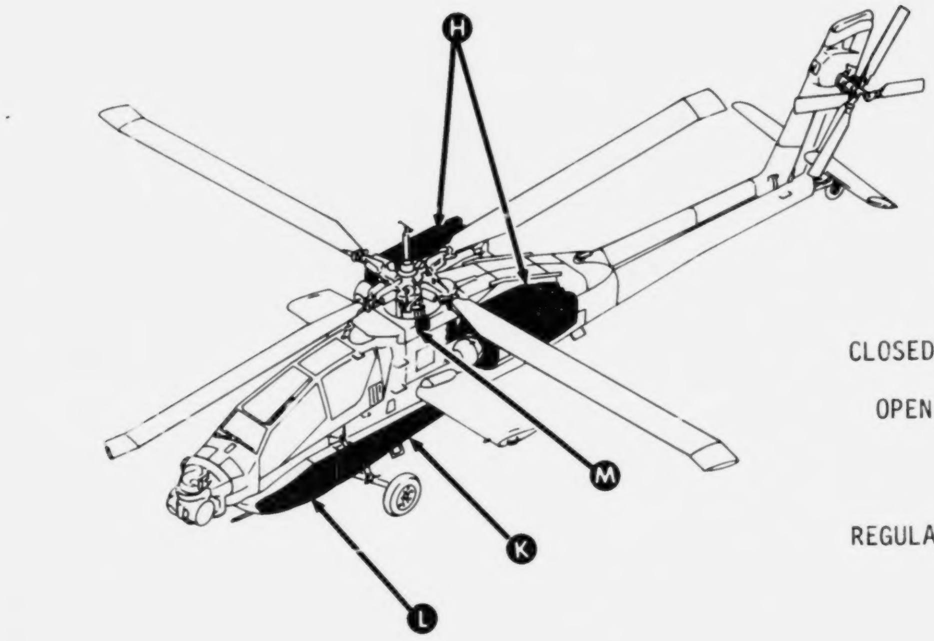
Ⓐ ELECTRICAL POWER DISTRIBUTION BOX (AFT VIEW)

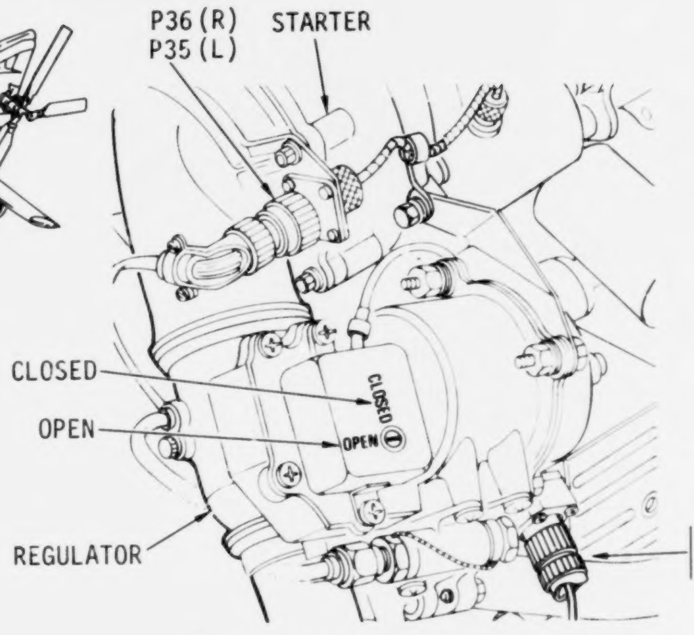

TB2-8
TB2-10
TB3-14
TB3-15
TB2-29
TB2
TB3

Ⓒ TERMINAL BOARDS (FORWARD VIEW)

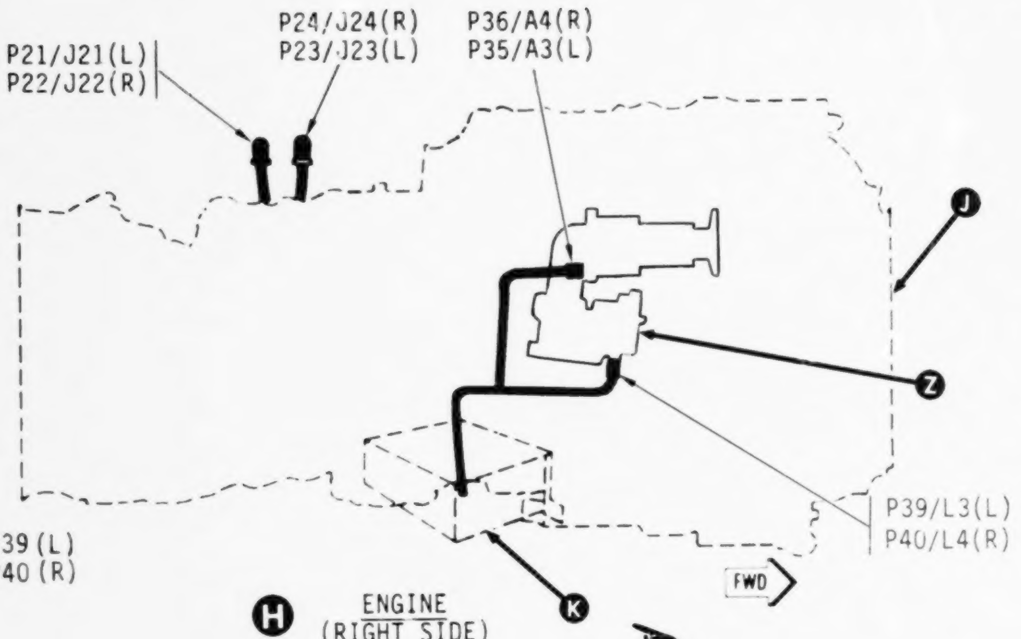
MM04/1-1351-1D

4-2-4. POWER PLANTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

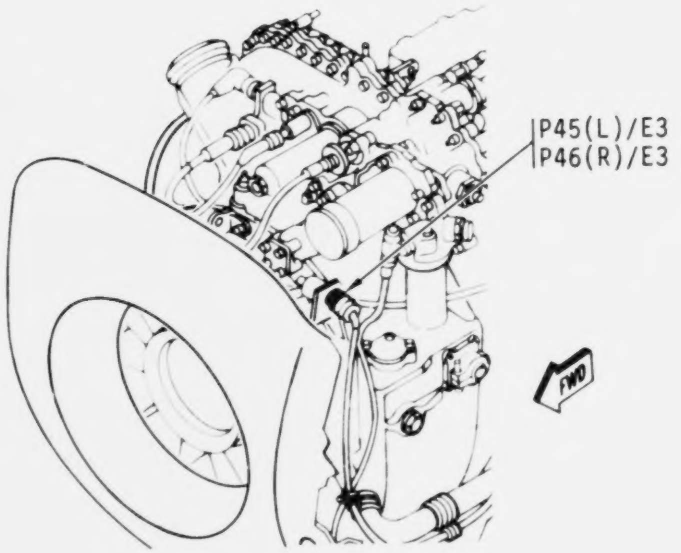



P36(R)
P35(L)
STARTER
CLOSED
OPEN
REGULATOR
P39(L)
P40(R)

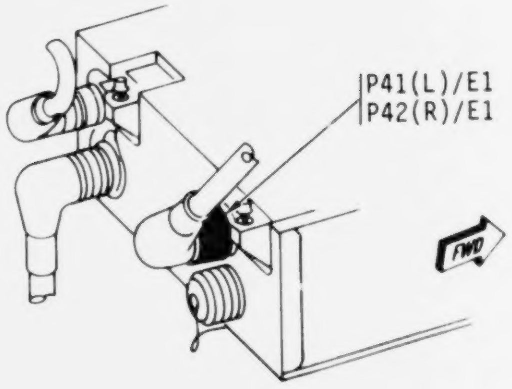
Z STARTER REGULATOR VALVE


P21/J21(L)
P22/J22(R)
P24/J24(R)
P23/J23(L)
P36/A4(R)
P35/A3(L)
J
Z
P39/L3(L)
P40/L4(R)
FWD
K

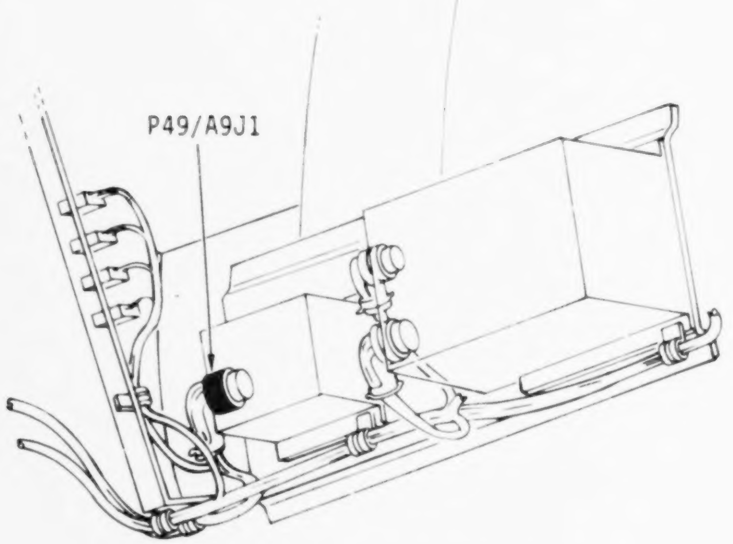
H ENGINE (RIGHT SIDE)


P45(L)/E3
P46(R)/E3
FWD

J ENGINE (FRONT)


P41(L)/E1
P42(R)/E1
FWD

I ELECTRICAL CONTROL UNIT (ECU)

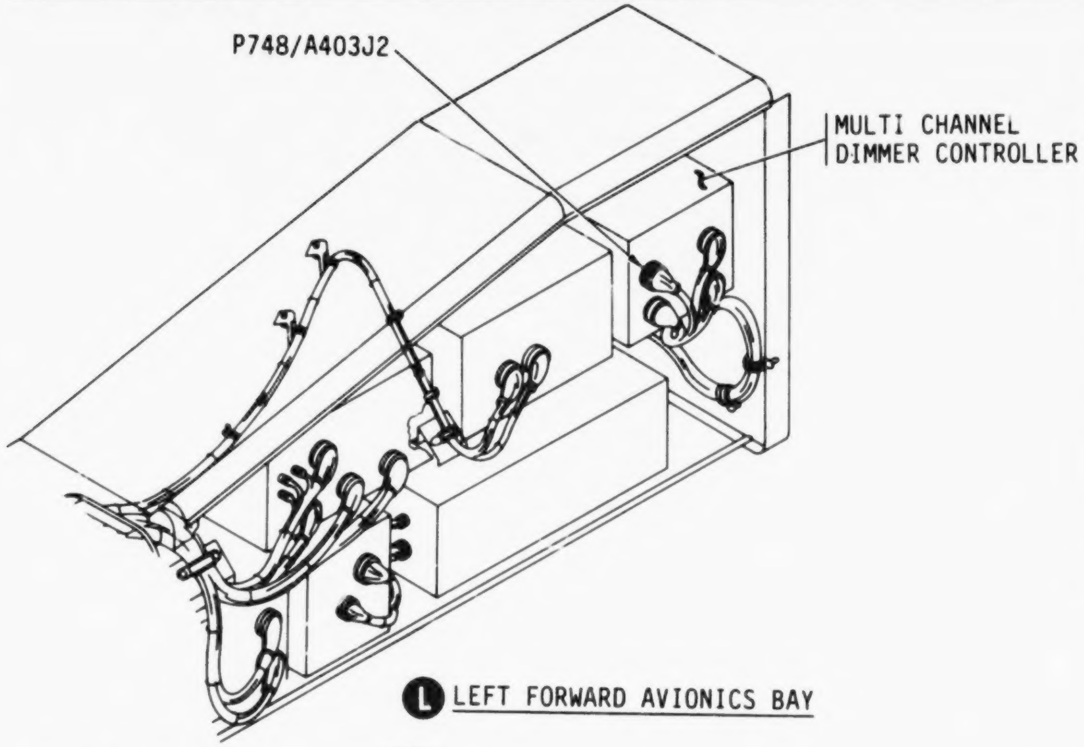


K BELOW PILOT FLOOR THROUGH FAIRING L140

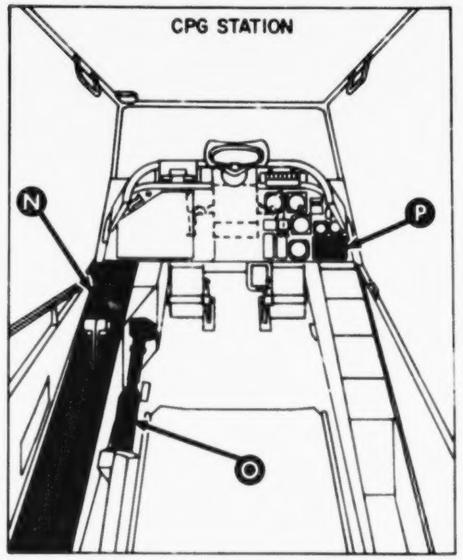
NOTES:
(R) OR (L) AFTER CONNECTOR REFERENCE DESIGNATOR INDICATES RIGHT OR LEFT ENGINE.

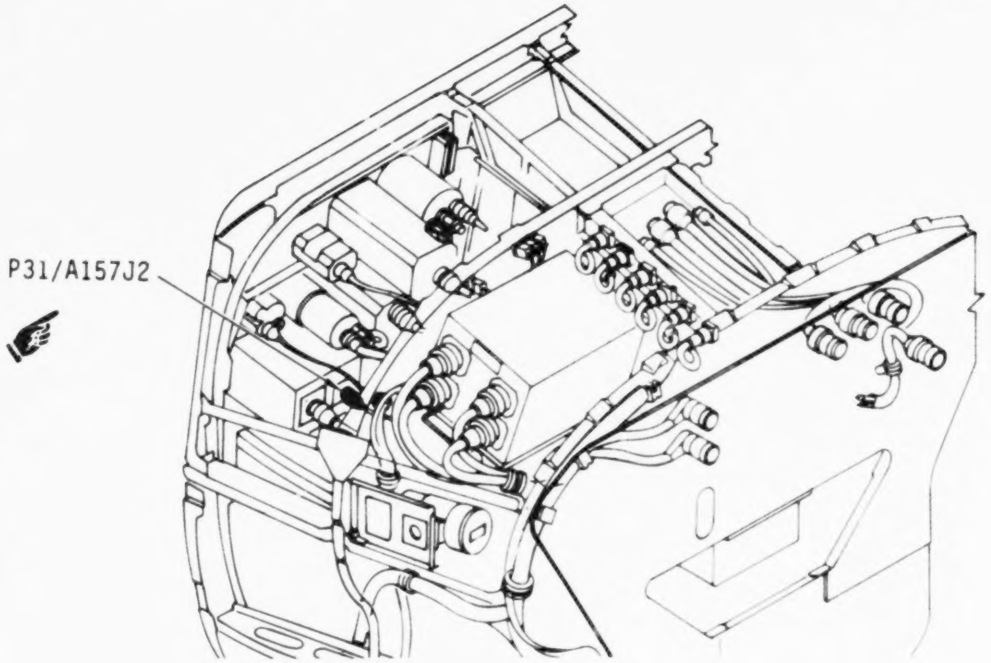
MM04/1-1351-4D

4-2-4. POWER PLANTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont) 4-2-4

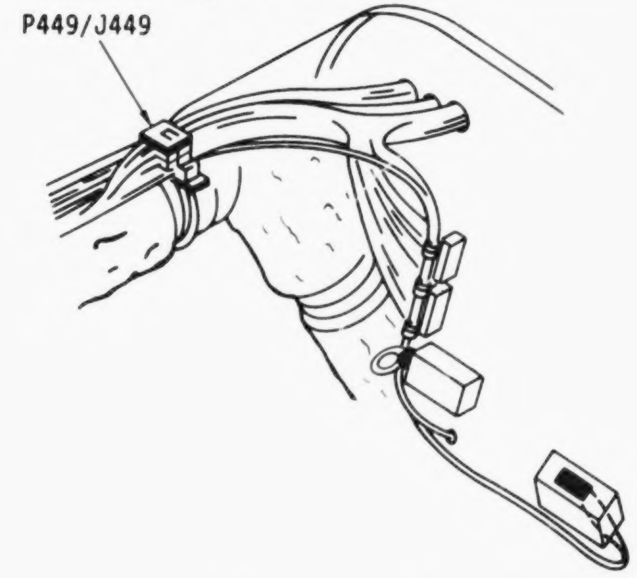

P748/A403J2
MULTI CHANNEL DIMMER CONTROLLER

Ⓛ LEFT FORWARD AVIONICS BAY

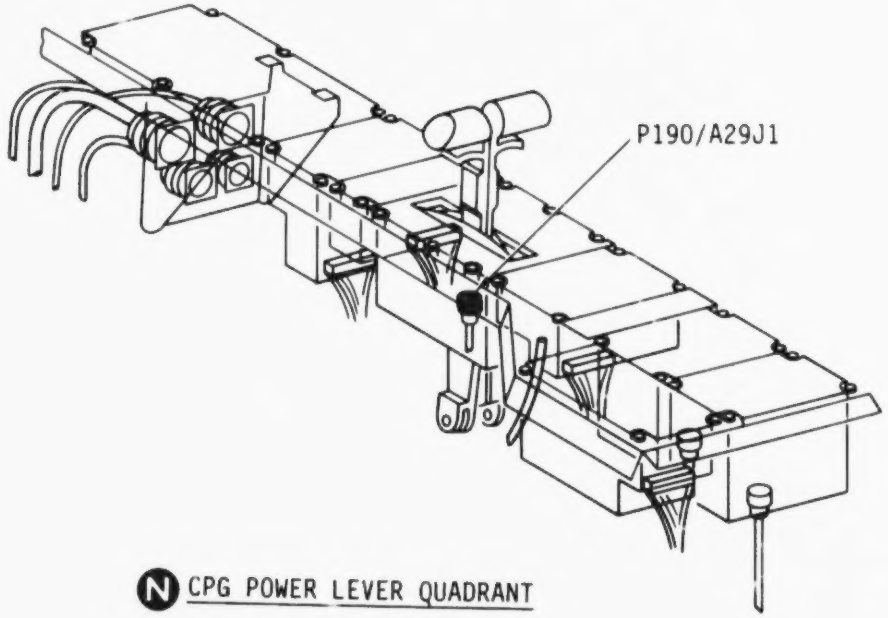

CPG STATION
N
P
O



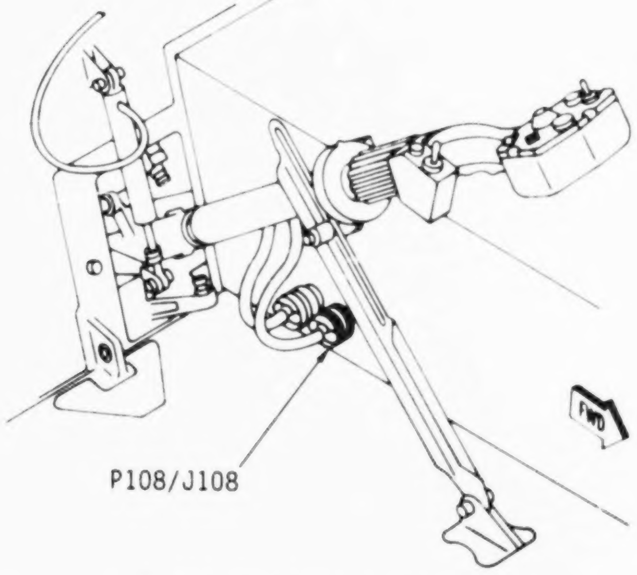
Ⓟ CPG INSTRUMENT PANEL



Ⓜ L.H. CROSSOVER DISCONNECT (AFT DECK THROUGH FAIRING T205L)



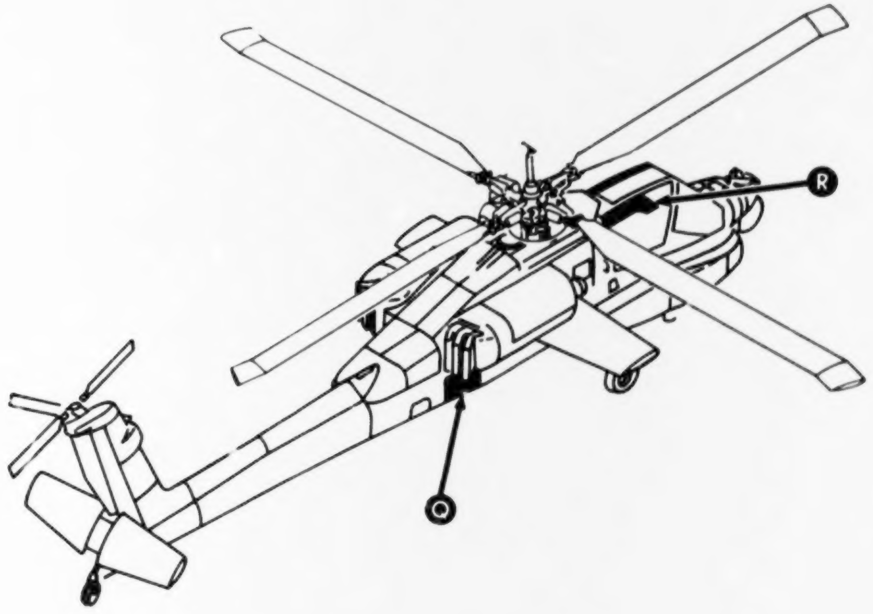
Ⓝ CPG POWER LEVER QUADRANT

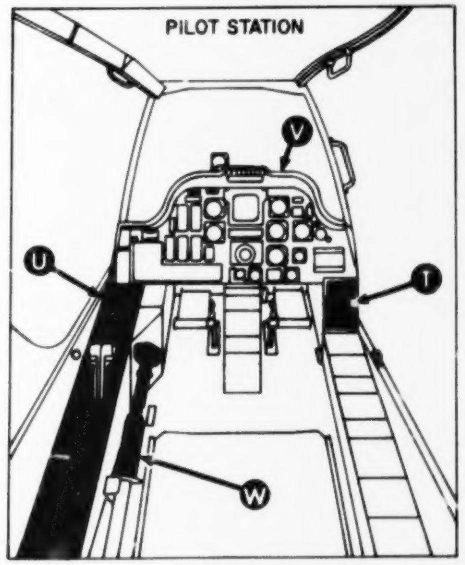

P108/J108
FWD

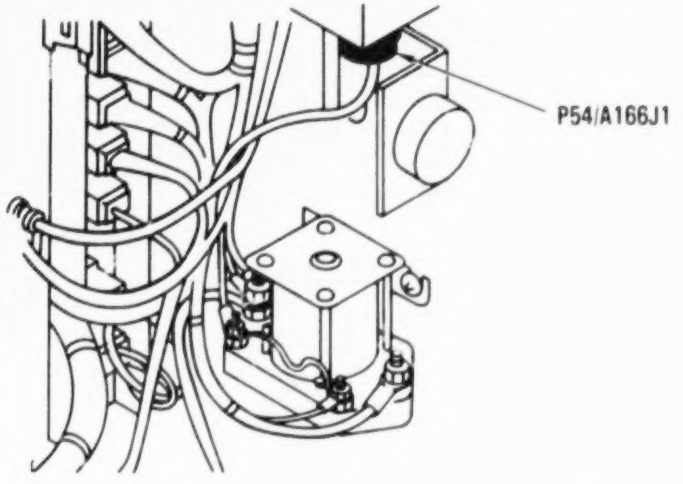
Ⓞ CPG COLLECTIVE STICK

MM04/1-1351-2B

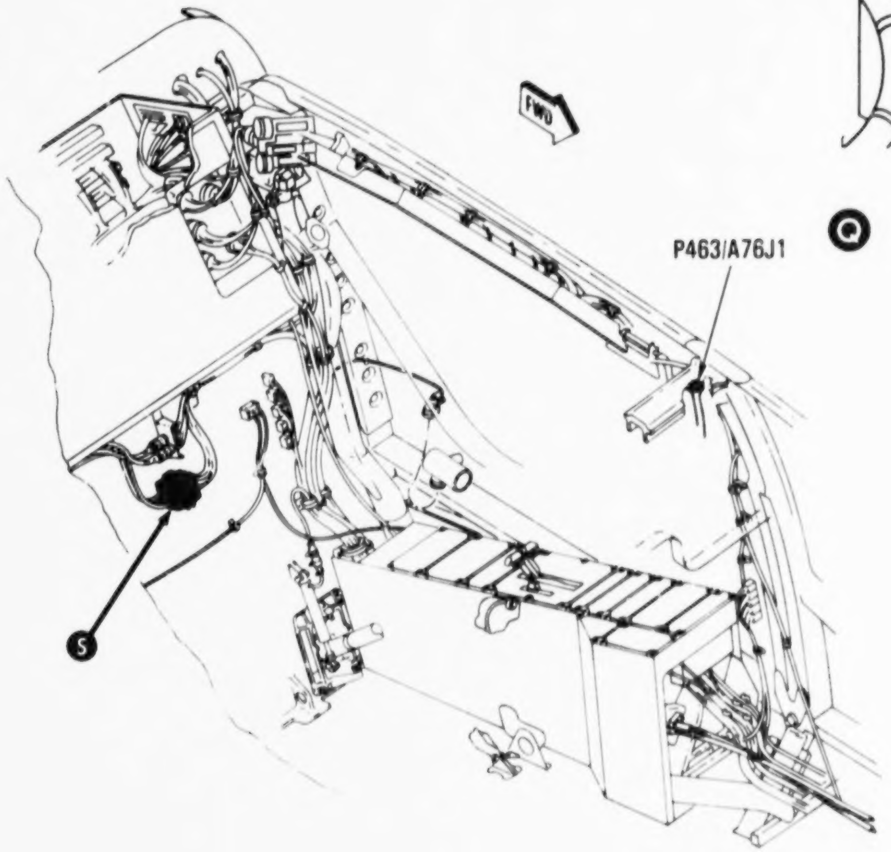
4-2-4. POWER PLANTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)



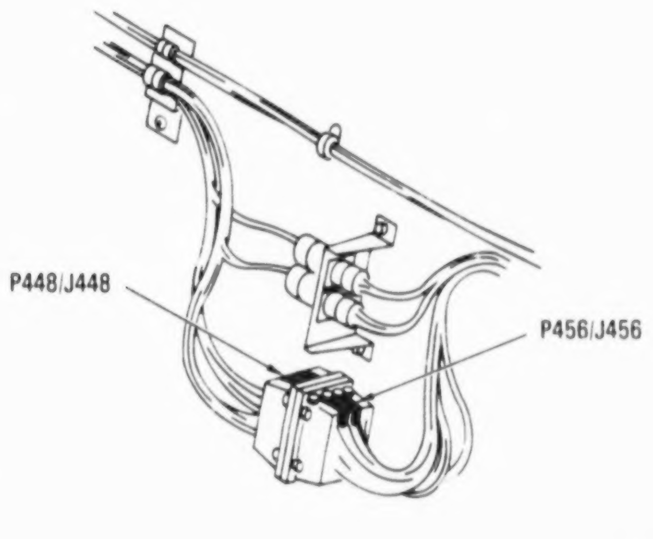

PILOT STATION
V
U
T
W



Q AFT AVIONICS BAY THROUGH DOOR R295


FWD
P463/A76J1
S

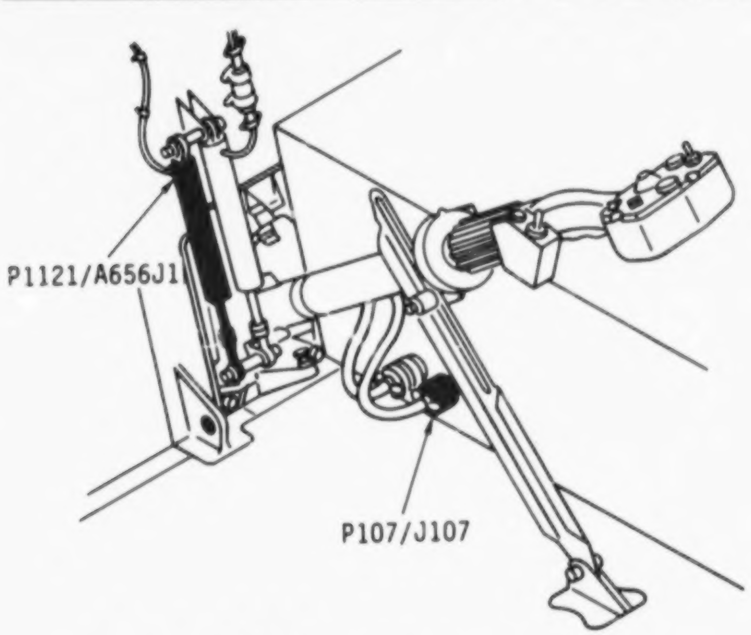
R PILOT STATION


P448/J448
P456/J456

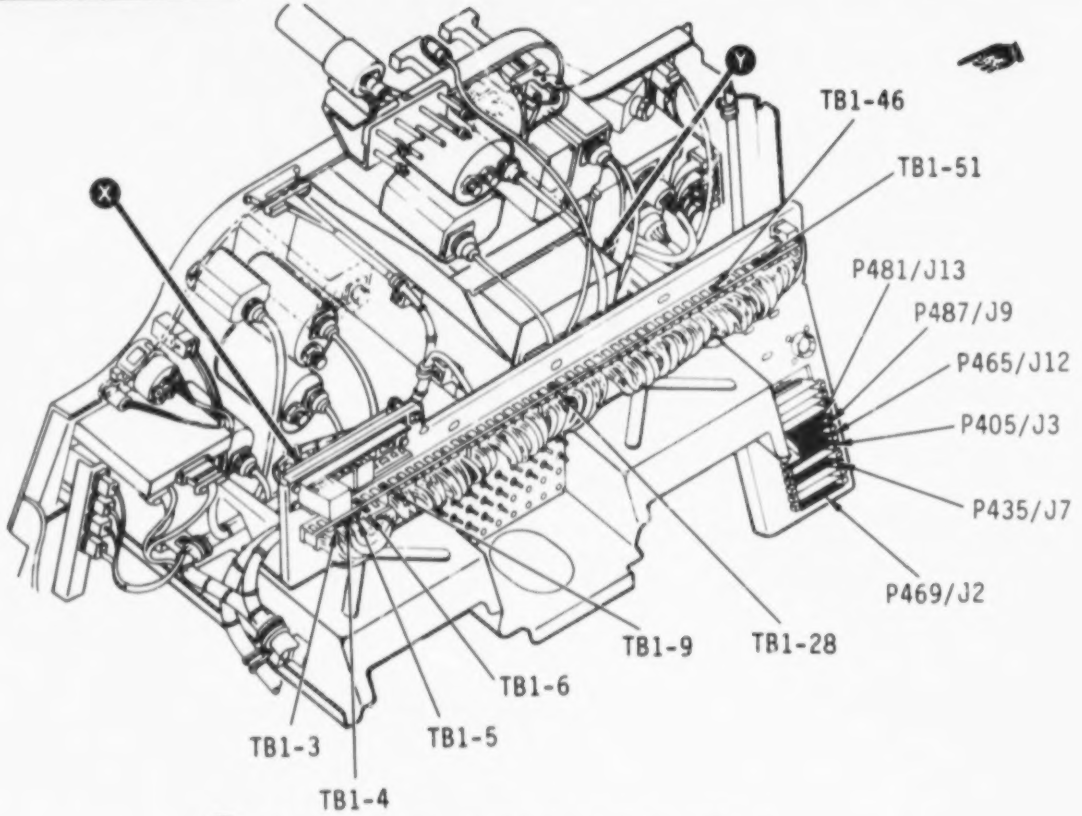
S AFT CROSSOVER DISCONNECT

MM04/1-1351-3A

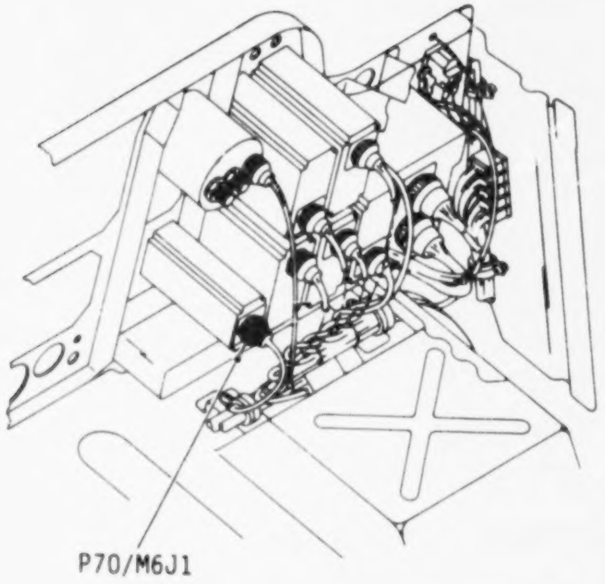
4-2-4. POWER PLANTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


P1121/A656J1
P107/J107

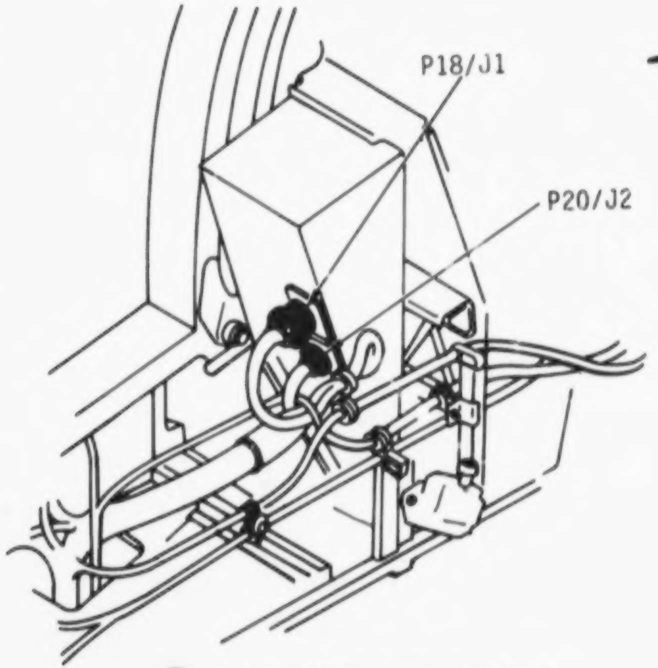
Ⓦ PILOT COLLECTIVE STICK


Ⓧ
Ⓨ
TB1-46
TB1-51
P481/J13
P487/J9
P465/J12
P405/J3
P435/J7
P469/J2
TB1-28
TB1-9
TB1-6
TB1-5
TB1-3
TB1-4

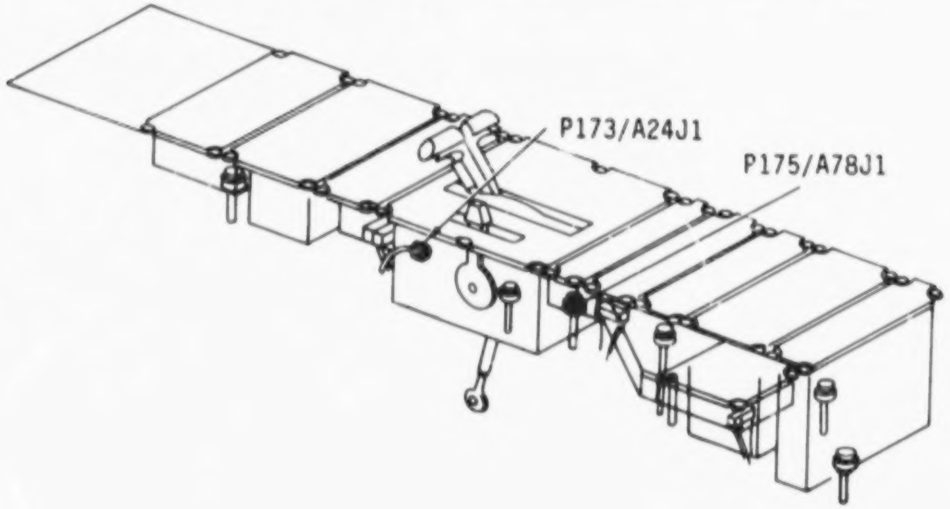
Ⓥ PILOT INSTRUMENT PANEL-MATRIX MODULE



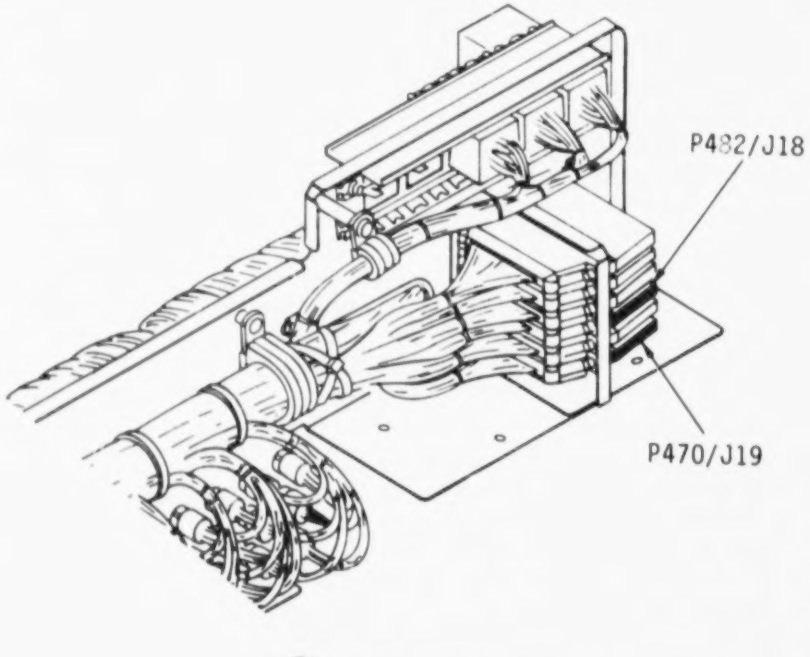
Ⓨ PILOT INSTRUMENT PANEL-LEFT SIDE


P18/J1
P20/J2

Ⓣ PILOT RIGHT SIDE CONSOLE


P173/A24J1
P175/A78J1

Ⓤ PILOT POWER QUADRANT


P482/J18
P470/J19

Ⓧ PILOT MATRIX MODULE (ROTATED)

MM04/1-1351-5C

4-2-5. ENGINE 1 DOES NOT ACCELERATE TO OR REMAIN BETWEEN 23 AND 25 PERCENT N_G IN IGN OVRD

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-4692

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

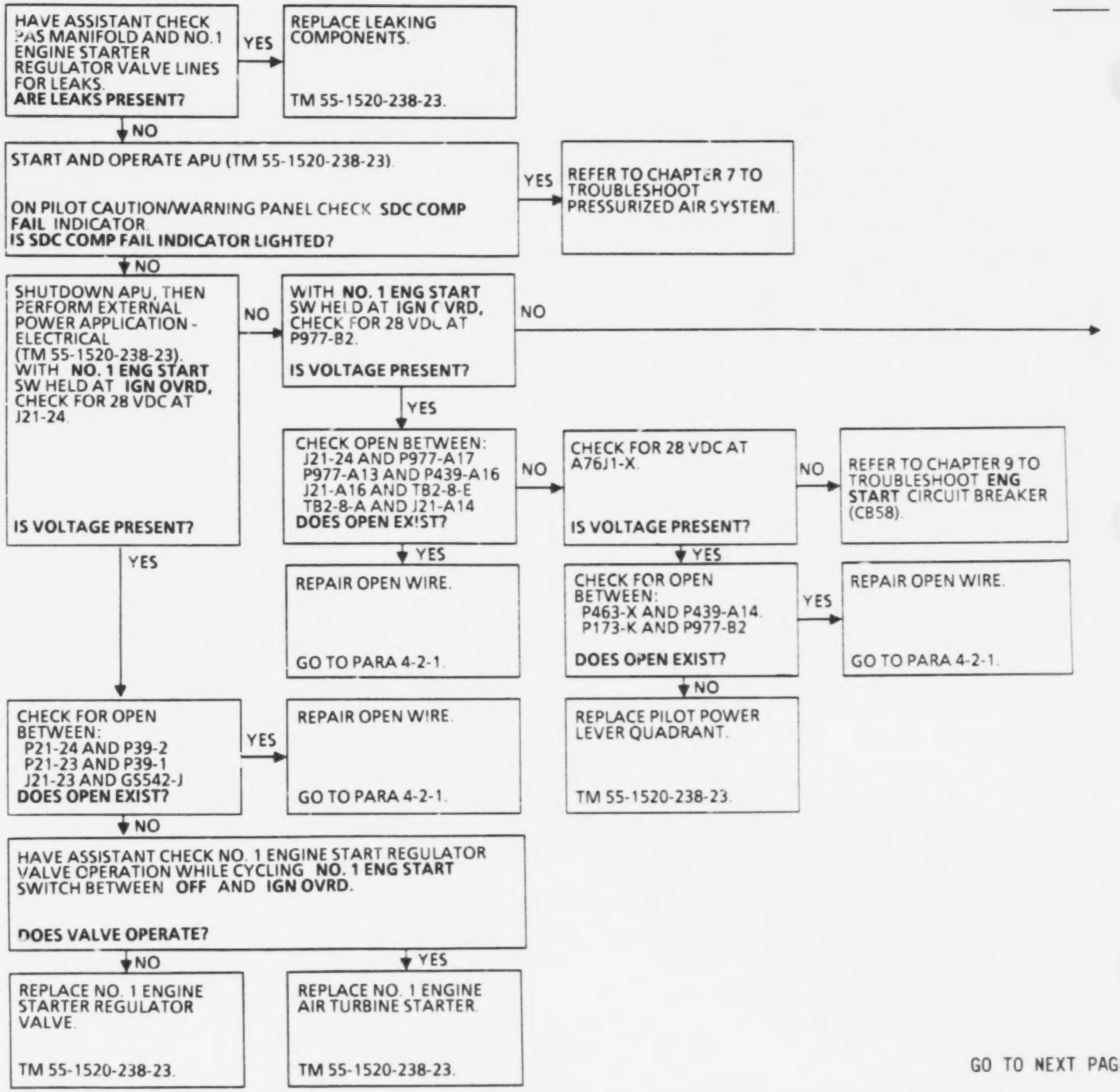
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN5 door open
	External Power Application - Electrical - Pressurized Air
Para 1-3-2	ICS connected

WARNING

- Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.
- During electrical troubleshooting, observe all safety precautions and remove external pressurized air. Failure to do so could result in death or serious injury due to main rotor blade rotation.



HAVE ASSISTANT CHECK PAS MANIFOLD AND NO. 1 ENGINE STARTER REGULATOR VALVE LINES FOR LEAKS. **ARE LEAKS PRESENT?**

REPLACE LEAKING COMPONENTS. TM 55-1520-238-23.

START AND OPERATE APU (TM 55-1520-238-23). ON PILOT CAUTION/WARNING PANEL CHECK **SDC COMP FAIL** INDICATOR. **IS SDC COMP FAIL INDICATOR LIGHTED?**

REFER TO CHAPTER 7 TO TROUBLESHOOT PRESSURIZED AIR SYSTEM.

SHUTDOWN APU, THEN PERFORM EXTERNAL POWER APPLICATION - ELECTRICAL (TM 55-1520-238-23). WITH **NO. 1 ENG START** SW HELD AT **IGN OVRD,** CHECK FOR 28 VDC AT J21-24. **IS VOLTAGE PRESENT?**

WITH **NO. 1 ENG START** SW HELD AT **IGN OVRD,** CHECK FOR 28 VDC AT P977-B2. **IS VOLTAGE PRESENT?**

CHECK OPEN BETWEEN: J21-24 AND P977-A17, P977-A13 AND P439-A16, J21-A16 AND TB2-8-E, TB2-8-A AND J21-A14. **DOES OPEN EXIST?**

CHECK FOR 28 VDC AT A76J1-X. **IS VOLTAGE PRESENT?**

REFER TO CHAPTER 9 TO TROUBLESHOOT **ENG START** CIRCUIT BREAKER (CB58).

REPAIR OPEN WIRE. GO TO PARA 4-2-1.

CHECK FOR OPEN BETWEEN: P463-X AND P439-A14, P173-K AND P977-B2. **DOES OPEN EXIST?**

REPAIR OPEN WIRE. GO TO PARA 4-2-1.

REPLACE PILOT POWER LEVER QUADRANT. TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN: P21-24 AND P39-2, P21-23 AND P39-1, J21-23 AND GS542-J. **DOES OPEN EXIST?**

REPAIR OPEN WIRE. GO TO PARA 4-2-1.

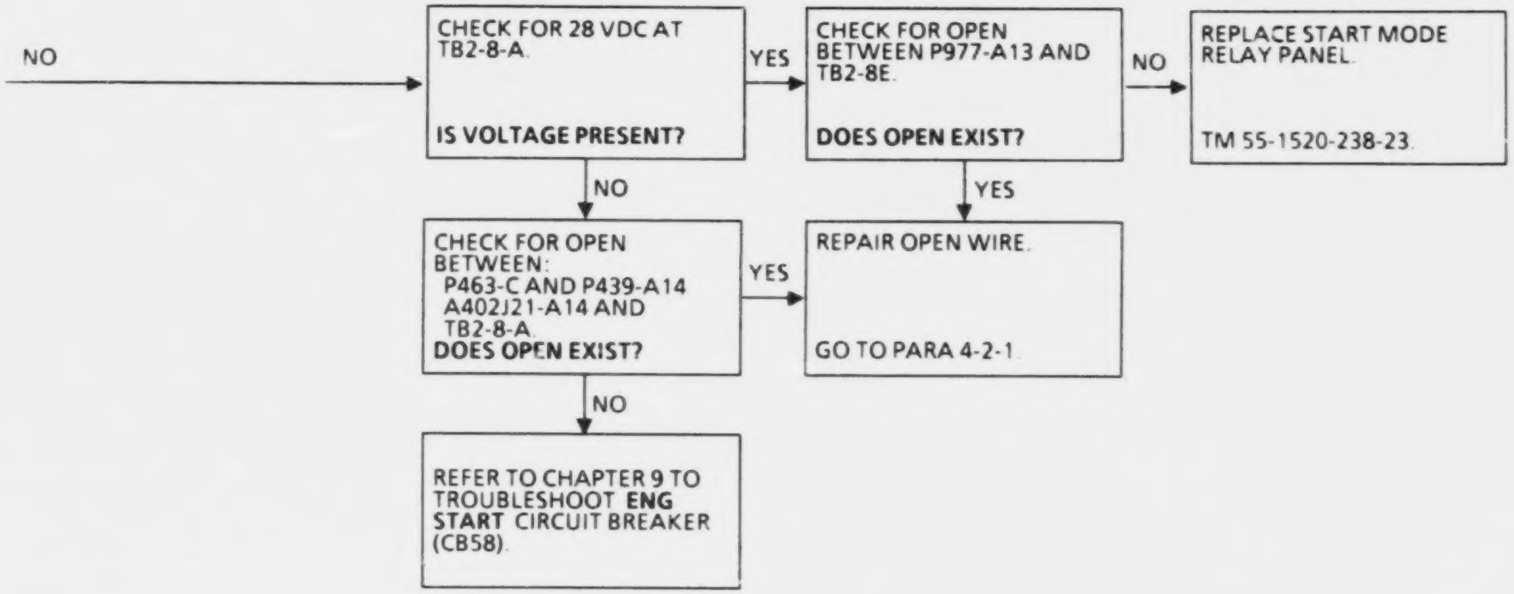
HAVE ASSISTANT CHECK NO. 1 ENGINE START REGULATOR VALVE OPERATION WHILE CYCLING **NO. 1 ENG START** SWITCH BETWEEN **OFF** AND **IGN OVRD. DOES VALVE OPERATE?**

REPLACE NO. 1 ENGINE STARTER REGULATOR VALVE. TM 55-1520-238-23.

REPLACE NO. 1 ENGINE AIR TURBINE STARTER. TM 55-1520-238-23.

GO TO NEXT PAGE

4-2-5. ENGINE 1 DOES NOT ACCELERATE TO OR REMAIN BETWEEN 23 AND 25 PERCENT N_G IN IGN OVRD (cont)


NO
CHECK FOR 28 VDC AT TB2-8-A.
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN P977-A13 AND TB2-8E.
DOES OPEN EXIST?
NO
REPLACE START MODE RELAY PANEL.
TM 55-1520-238-23.
NO
YES
CHECK FOR OPEN BETWEEN:
P463-C AND P439-A14
A402J21-A14 AND TB2-8-A.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT ENG START CIRCUIT BREAKER (CB58).

END OF TASK

4-2-6. ENG START CIRCUIT BREAKER (CB58) - DOES NOT STAY CLOSED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

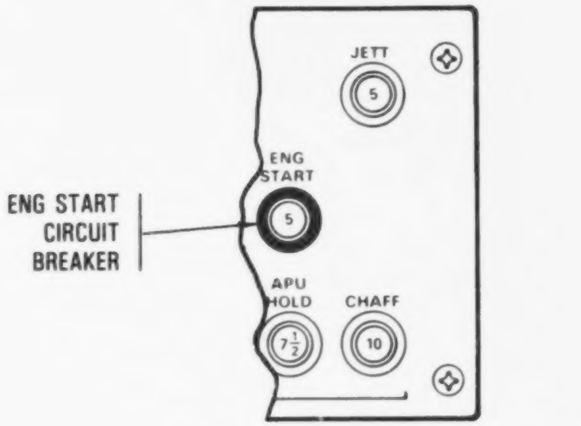
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

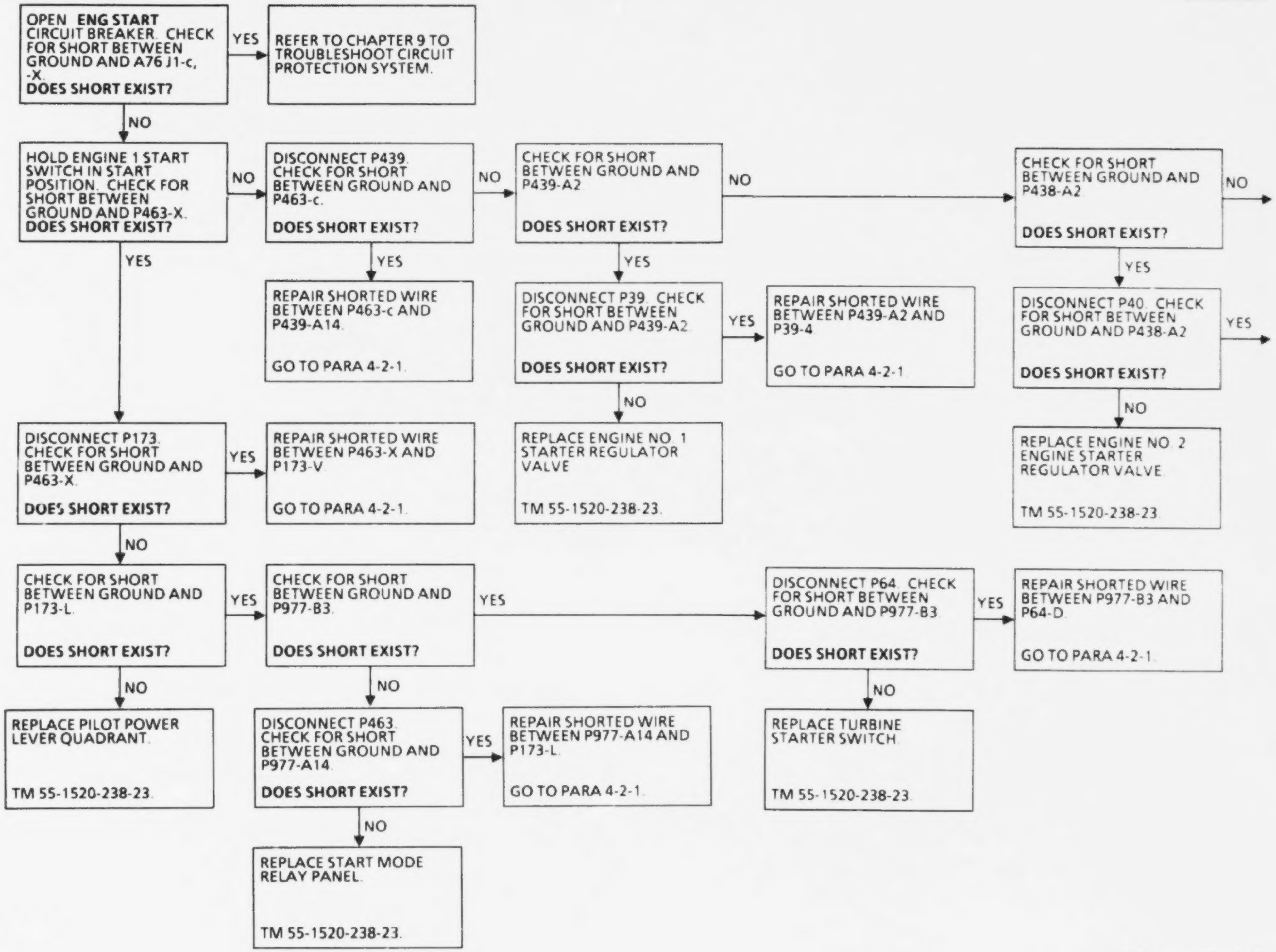
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-1269



OPEN **ENG START** CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND A76 J1-c, -X.
DOES SHORT EXIST?

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

HOLD ENGINE 1 START SWITCH IN START POSITION. CHECK FOR SHORT BETWEEN GROUND AND P463-X.
DOES SHORT EXIST?

DISCONNECT P439. CHECK FOR SHORT BETWEEN GROUND AND P463-c.
DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN GROUND AND P439-A2.
DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN GROUND AND P438-A2.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P463-c AND P439-A14.
GO TO PARA 4-2-1.

DISCONNECT P39. CHECK FOR SHORT BETWEEN GROUND AND P439-A2.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P439-A2 AND P39-4.
GO TO PARA 4-2-1.

DISCONNECT P40. CHECK FOR SHORT BETWEEN GROUND AND P438-A2.
DOES SHORT EXIST?

DISCONNECT P173. CHECK FOR SHORT BETWEEN GROUND AND P463-X.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P463-X AND P173-V.
GO TO PARA 4-2-1.

REPLACE ENGINE NO. 1 STARTER REGULATOR VALVE.
TM 55-1520-238-23.

REPLACE ENGINE NO. 2 ENGINE STARTER REGULATOR VALVE.
TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN GROUND AND P173-L.
DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN GROUND AND P977-B3.
DOES SHORT EXIST?

DISCONNECT P64. CHECK FOR SHORT BETWEEN GROUND AND P977-B3.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P977-B3 AND P64-D.
GO TO PARA 4-2-1.

REPLACE PILOT POWER LEVER QUADRANT.
TM 55-1520-238-23.

DISCONNECT P463. CHECK FOR SHORT BETWEEN GROUND AND P977-A14.
DOES SHORT EXIST?

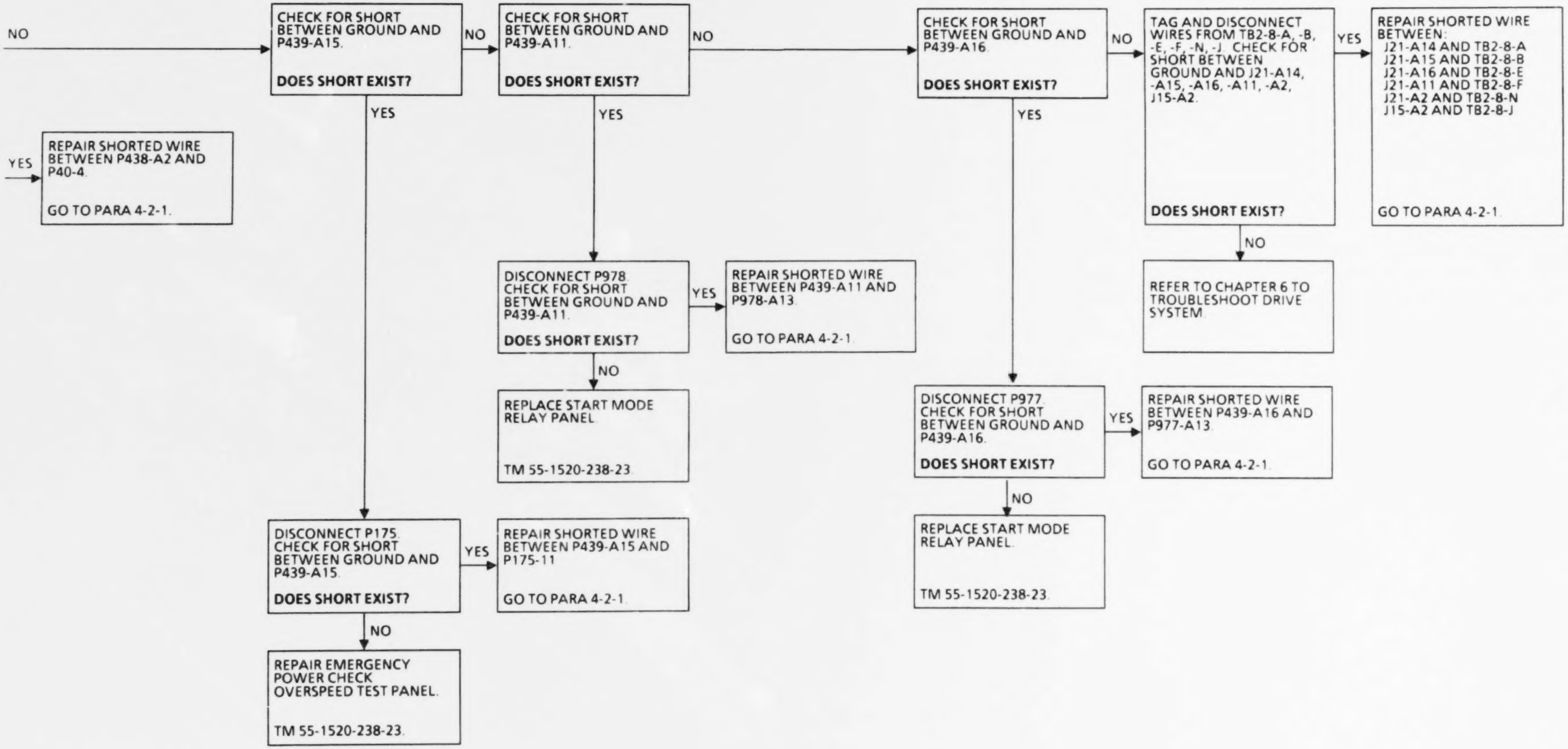
REPAIR SHORTED WIRE BETWEEN P977-A14 AND P173-L.
GO TO PARA 4-2-1.

REPLACE TURBINE STARTER SWITCH.
TM 55-1520-238-23.

REPLACE START MODE RELAY PANEL.
TM 55-1520-238-23.

GO TO NEXT PAGE

4-2-6. ENG START CIRCUIT BREAKER (CB58) - DOES NOT STAY CLOSED (cont)



REPAIR SHORTED WIRE BETWEEN P438-A2 AND P40-4.
GO TO PARA 4-2-1.

CHECK FOR SHORT BETWEEN GROUND AND P439-A15.
DOES SHORT EXIST?

DISCONNECT P175. CHECK FOR SHORT BETWEEN GROUND AND P439-A15.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P439-A15 AND P175-11.
GO TO PARA 4-2-1.

REPAIR EMERGENCY POWER CHECK OVERSPEED TEST PANEL.
TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN GROUND AND P439-A11.
DOES SHORT EXIST?

DISCONNECT P978. CHECK FOR SHORT BETWEEN GROUND AND P439-A11.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P439-A11 AND P978-A13.
GO TO PARA 4-2-1.

REPLACE START MODE RELAY PANEL.
TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN GROUND AND P439-A16.
DOES SHORT EXIST?

DISCONNECT P977. CHECK FOR SHORT BETWEEN GROUND AND P439-A16.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P439-A16 AND P977-A13.
GO TO PARA 4-2-1.

REPLACE START MODE RELAY PANEL.
TM 55-1520-238-23.

TAG AND DISCONNECT WIRES FROM TB2-8-A, -B, -E, -F, -N, -J. CHECK FOR SHORT BETWEEN GROUND AND J21-A14, -A15, -A16, -A11, -A2, J15-A2.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
J21-A14 AND TB2-8-A
J21-A15 AND TB2-8-B
J21-A16 AND TB2-8-E
J21-A11 AND TB2-8-F
J21-A2 AND TB2-8-N
J15-A2 AND TB2-8-J
GO TO PARA 4-2-1.

REFER TO CHAPTER 6 TO TROUBLESHOOT DRIVE SYSTEM.

END OF TASK

4-2-7. ENG START ENG 1 INDICATOR - IS NOT LIGHTED WITH ENGINE 1 STARTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

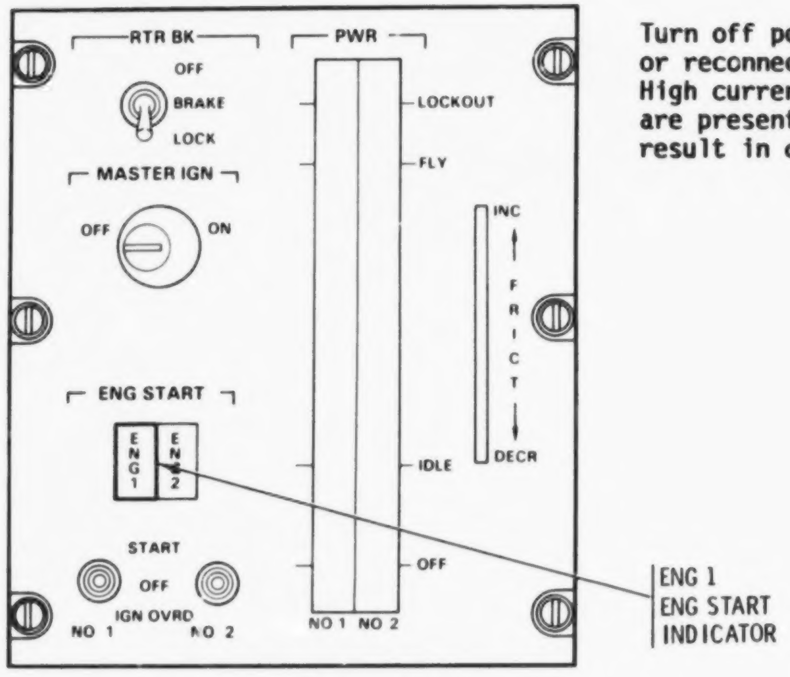
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1 door open
Para 4-1-2	POWER PLANTS - POWER UP completed
Para 1-3-2	ICS connected

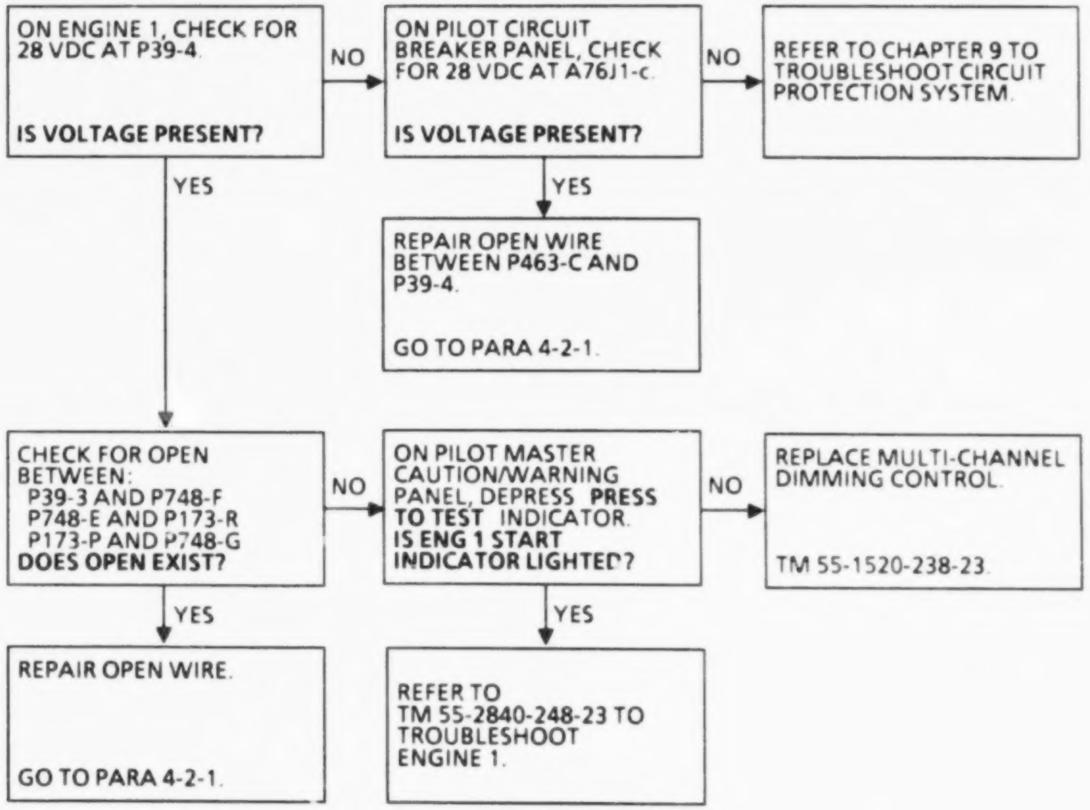
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
PWR
LOCKOUT
FLY
IDLE
OFF
INC
FRICT
DECR
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
NO 1 NO 2
ENG 1
ENG START
INDICATOR

PILOT POWER QUADRANT PANEL

MM04/1-1270A



ON ENGINE 1, CHECK FOR 28 VDC AT P39-4.
IS VOLTAGE PRESENT?

ON PILOT CIRCUIT BREAKER PANEL, CHECK FOR 28 VDC AT A76J1-c.
IS VOLTAGE PRESENT?

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

REPAIR OPEN WIRE BETWEEN P463-C AND P39-4.
GO TO PARA 4-2-1.

CHECK FOR OPEN BETWEEN:
P39-3 AND P748-F
P748-E AND P173-R
P173-P AND P748-G
DOES OPEN EXIST?

ON PILOT MASTER CAUTION/WARNING PANEL, DEPRESS **PRESS TO TEST** INDICATOR.
IS ENG 1 START INDICATOR LIGHTED?

REPLACE MULTI-CHANNEL DIMMING CONTROL.
TM 55-1520-238-23.

REPAIR OPEN WIRE.
GO TO PARA 4-2-1.

REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.

END OF TASK

4-2-8. ENG START ENG 1 START INDICATOR - STAYS LIGHTED ABOVE 52% N_G

Tools: (para 4-2-7)

Personnel Required: (para 4-2-7)

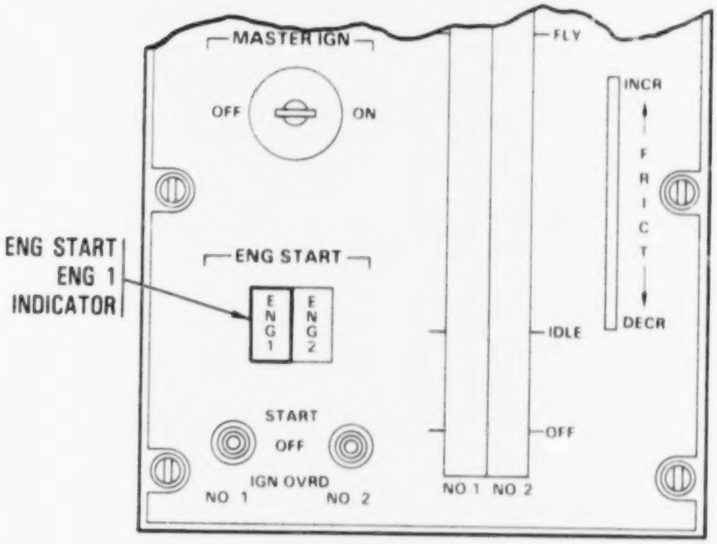
References: (para 4-2-7)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 panel removed
Para 4-1-2	POWER PLANTS - POWER UP completed
Para 1-3-2	ICS connected

WARNING

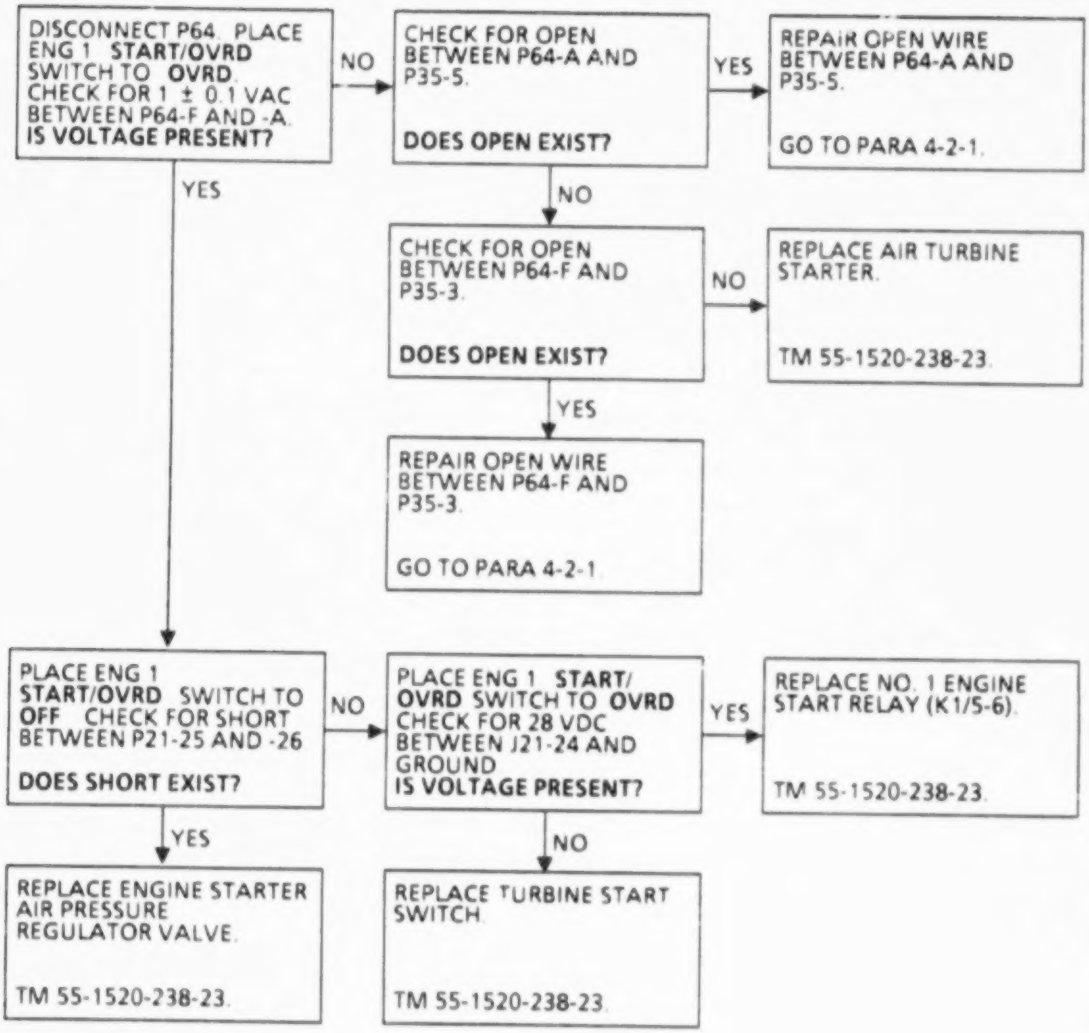
- Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.
- During electrical troubleshooting, observe all safety precautions and remove external pressurized air. Failure to do so could result in death of serious injury due to main rotor blade rotation.


MASTER IGN
OFF
ON
ENG START
ENG 1
INDICATOR
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
FLY
IDLE
OFF
NO 1
NO 2
INCR
FRICT
DECR

MM04/1-1271

PILOT POWER QUADRANT PANEL

END OF TASK



DISCONNECT P64. PLACE ENG 1 **START/OVRD** SWITCH TO **OVRD**. CHECK FOR 1 ± 0.1 VAC BETWEEN P64-F AND -A. **IS VOLTAGE PRESENT?**

CHECK FOR OPEN BETWEEN P64-A AND P35-5. **DOES OPEN EXIST?**

REPAIR OPEN WIRE BETWEEN P64-A AND P35-5. GO TO PARA 4-2-1.

CHECK FOR OPEN BETWEEN P64-F AND P35-3. **DOES OPEN EXIST?**

REPLACE AIR TURBINE STARTER. TM 55-1520-238-23.

REPAIR OPEN WIRE BETWEEN P64-F AND P35-3. GO TO PARA 4-2-1.

PLACE ENG 1 **START/OVRD** SWITCH TO **OFF**. CHECK FOR SHORT BETWEEN P21-25 AND -26. **DOES SHORT EXIST?**

PLACE ENG 1 **START/OVRD** SWITCH TO **OVRD**. CHECK FOR 28 VDC BETWEEN J21-24 AND GROUND. **IS VOLTAGE PRESENT?**

REPLACE NO. 1 ENGINE START RELAY (K1/5-6). TM 55-1520-238-23.

REPLACE ENGINE STARTER AIR PRESSURE REGULATOR VALVE. TM 55-1520-238-23.

REPLACE TURBINE START SWITCH. TM 55-1520-238-23.

END OF TASK

4-2-9. ENGINE 1 OUT INDICATORS - ARE LIGHTED WITH ENGINE 1 RUNNING

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10 Attack Helicopter Repairer
66F10 Aircraft Electrician

References:

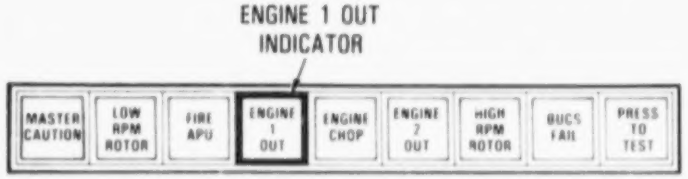
TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 4-1-2	POWER PLANTS - POWER UP completed
■Para 1-3-2	ICS connected

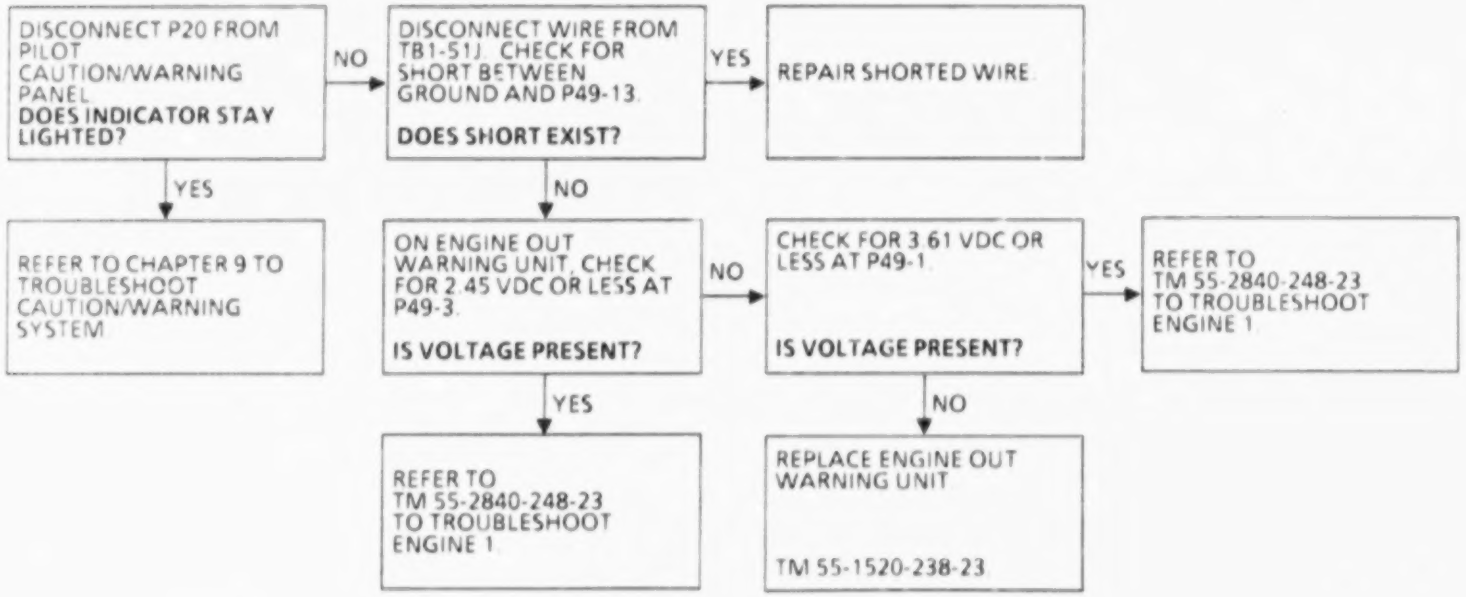
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ENGINE 1 OUT INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL (TYPICAL)

MM04/1-1272


DISCONNECT P20 FROM PILOT CAUTION/WARNING PANEL. DOES INDICATOR STAY LIGHTED?
NO
DISCONNECT WIRE FROM TB1-51J. CHECK FOR SHORT BETWEEN GROUND AND P49-13. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING SYSTEM.
NO
ON ENGINE OUT WARNING UNIT, CHECK FOR 2.45 VDC OR LESS AT P49-3. IS VOLTAGE PRESENT?
NO
CHECK FOR 3.61 VDC OR LESS AT P49-1. IS VOLTAGE PRESENT?
YES
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.
YES
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.
NO
REPLACE ENGINE OUT WARNING UNIT. TM 55-1520-238-23.

END OF TASK

4-2-10. ENGINE 1 N_G - DOES NOT REMAIN STABLE WITH CIRCUIT A CLOSED

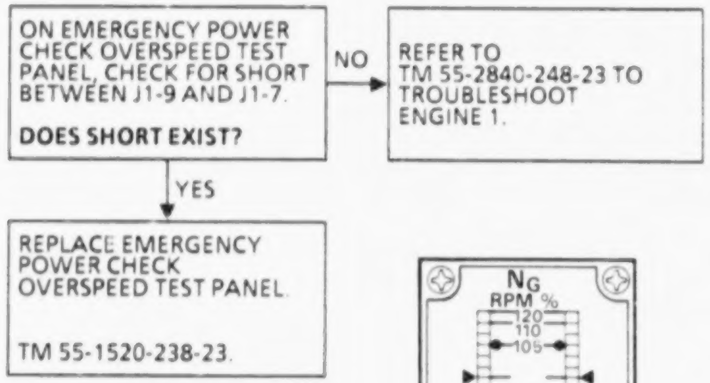
Tools: (para 4-2-9)

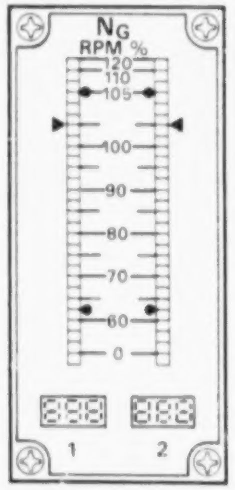
Personnel Required: (para 4-2-9)

References: (para 4-2-9)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


ON EMERGENCY POWER CHECK OVERSPEED TEST PANEL, CHECK FOR SHORT BETWEEN J1-9 AND J1-7. DOES SHORT EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.
YES
REPLACE EMERGENCY POWER CHECK OVERSPEED TEST PANEL. TM 55-1520-238-23.


NG
RPM %
120
110
105
100
90
80
70
60
0
1
2

PILOT ENGINE GAS GENERATOR INDICATOR

MM04/1-1273

END OF TASK

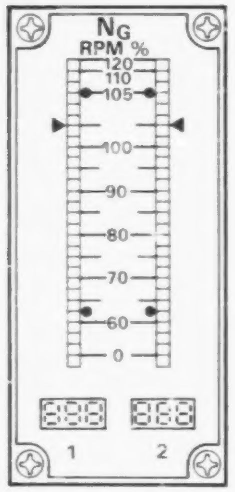
4-2-11. ENGINE 1 N_G - DOES NOT REMAIN STABLE WITH CIRCUIT B CLOSED

Tools: (para 4-2-9)

Personnel Required: (para 4-2-9)

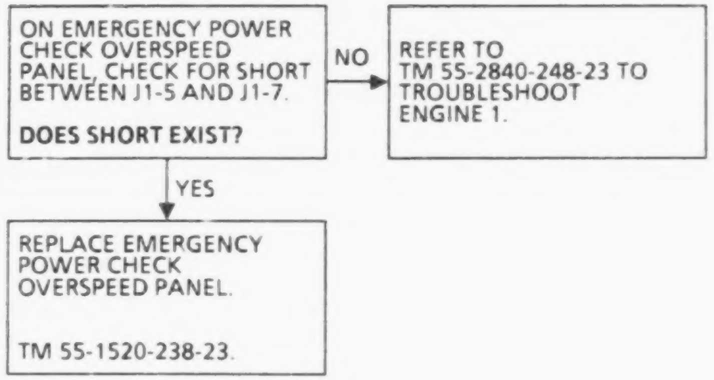
References: (para 4-2-9)

Equipment Conditions: (para 4-2-10)


NG
RPM %
120
110
105
100
90
80
70
60
0
1
2

PILOT ENGINE GAS GENERATOR INDICATOR

MM04/1-1274


ON EMERGENCY POWER CHECK OVERSPEED PANEL, CHECK FOR SHORT BETWEEN J1-5 AND J1-7.
DOES SHORT EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.
YES
REPLACE EMERGENCY POWER CHECK OVERSPEED PANEL.
TM 55-1520-238-23.

END OF TASK

4-2-12. ENGINE 1 N_G - DOES NOT DECREASE WITH CKT A AND CKT B CLOSED

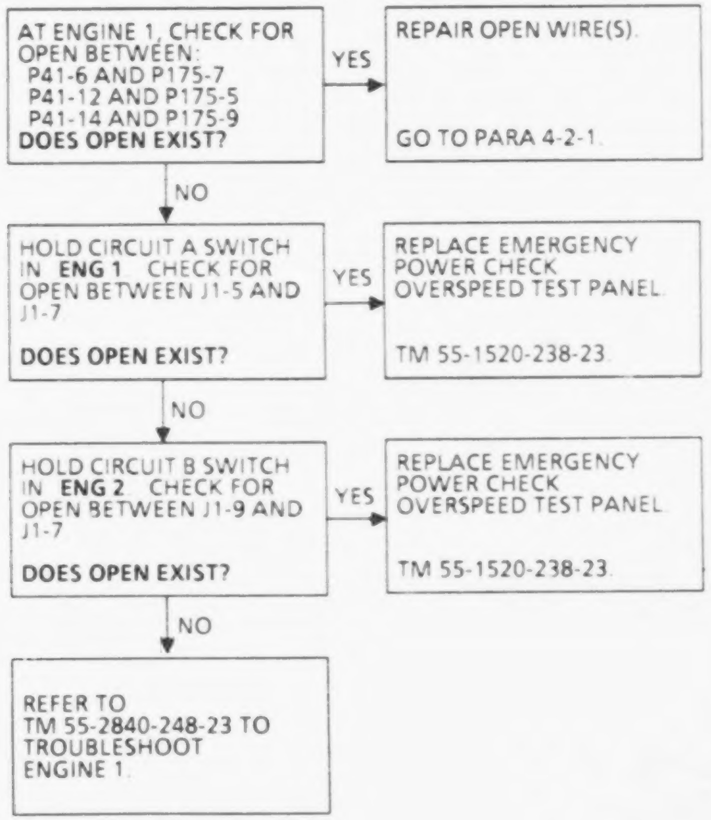
Tools: (para 4-2-9)

Personnel Required: (para 4-2-9)

References: (para 4-2-9)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L230 fairing removed


AT ENGINE 1, CHECK FOR OPEN BETWEEN:
P41-6 AND P175-7
P41-12 AND P175-5
P41-14 AND P175-9
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE(S).
GO TO PARA 4-2-1.
NO
HOLD CIRCUIT A SWITCH IN ENG 1. CHECK FOR OPEN BETWEEN J1-5 AND J1-7
DOES OPEN EXIST?
YES
REPLACE EMERGENCY POWER CHECK OVERSPEED TEST PANEL.
TM 55-1520-238-23.
NO
HOLD CIRCUIT B SWITCH IN ENG 2. CHECK FOR OPEN BETWEEN J1-9 AND J1-7
DOES OPEN EXIST?
YES
REPLACE EMERGENCY POWER CHECK OVERSPEED TEST PANEL.
TM 55-1520-238-23.
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.

END OF TASK

4-2-13. CHIPS ENG 1 INDICATOR - IS LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

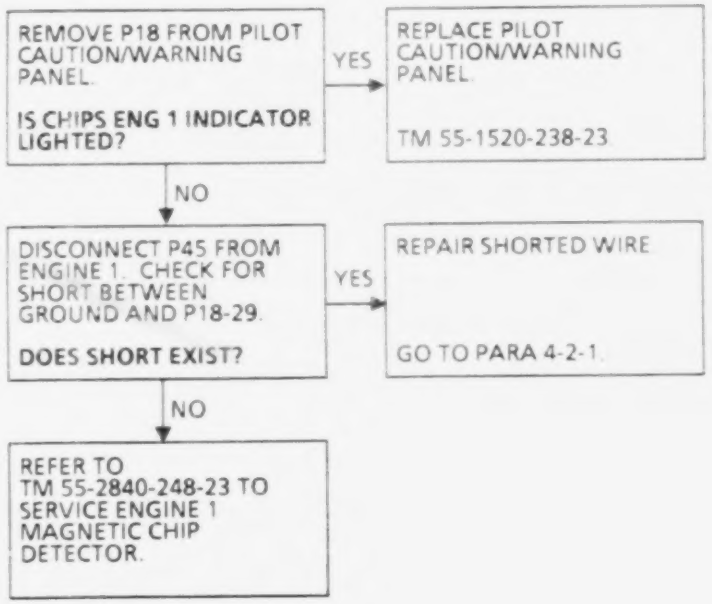
TM 55-1520-238-23
TM 55-2840-248-23

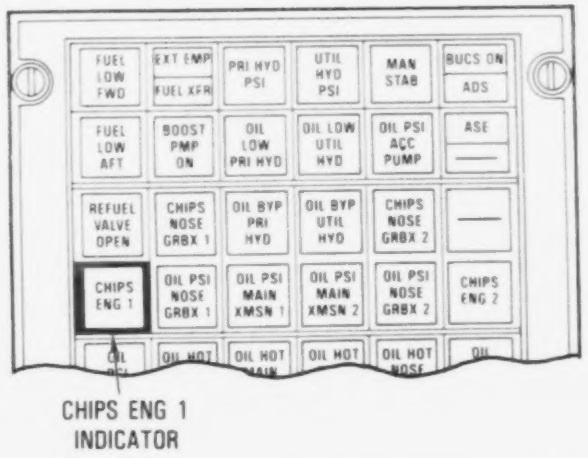
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.
IS CHIPS ENG 1 INDICATOR LIGHTED?
YES
REPLACE PILOT CAUTION/WARNING PANEL.
TM 55-1520-238-23.
NO
DISCONNECT P45 FROM ENGINE 1. CHECK FOR SHORT BETWEEN GROUND AND P18-29.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
GO TO PARA 4-2-1.
NO
REFER TO TM 55-2840-248-23 TO SERVICE ENGINE 1 MAGNETIC CHIP DETECTOR.


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
CHIPS ENG 1 INDICATOR

PILOT CAUTION/WARNING PANEL

MM04/1-1275

END OF TASK

4-2-14. OIL BYP ENG 1 INDICATOR - IS LIGHTED

Tools: (para 4-2-13)

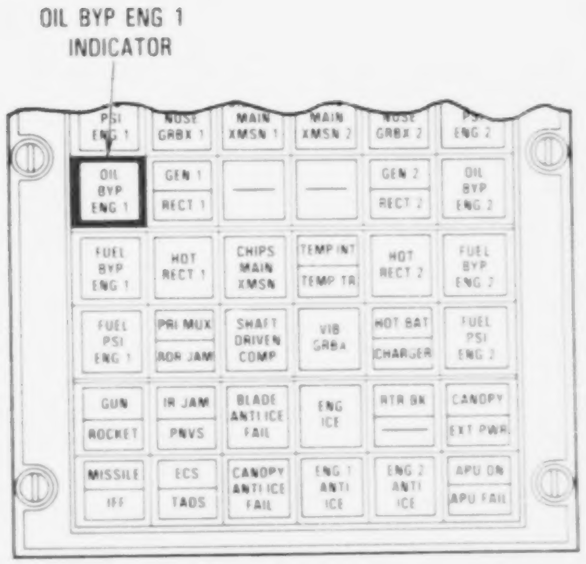
Personnel Required: (para 4-2-13)

References: (para 4-2-13)

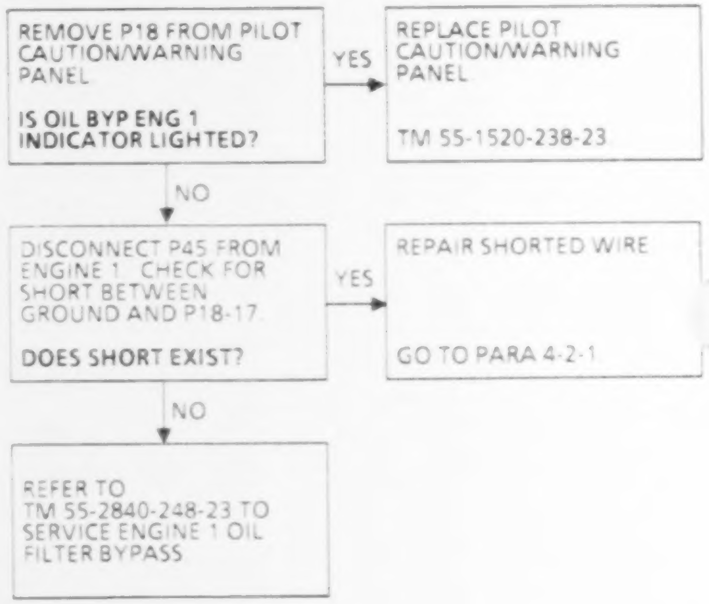
Equipment Conditions: (para 4-2-13)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OIL BYP ENG 1 INDICATOR
PSI ENG 1
NOSE GRBX 1
MAIN XMSN 1
MAIN XMSN 2
NOSE GRBX 2
ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL


REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.
IS OIL BYP ENG 1 INDICATOR LIGHTED?
YES
REPLACE PILOT CAUTION/WARNING PANEL.
TM 55-1520-238-23.
NO
DISCONNECT P45 FROM ENGINE 1. CHECK FOR SHORT BETWEEN GROUND AND P18-17.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
GO TO PARA 4-2-1.
NO
REFER TO TM 55-2840-248-23 TO SERVICE ENGINE 1 OIL FILTER BYPASS.

MM04/1-1276

END OF TASK

4-2-15. FUEL BYP ENG 1 INDICATOR - IS LIGHTED

Tools: (para 4-2-13)

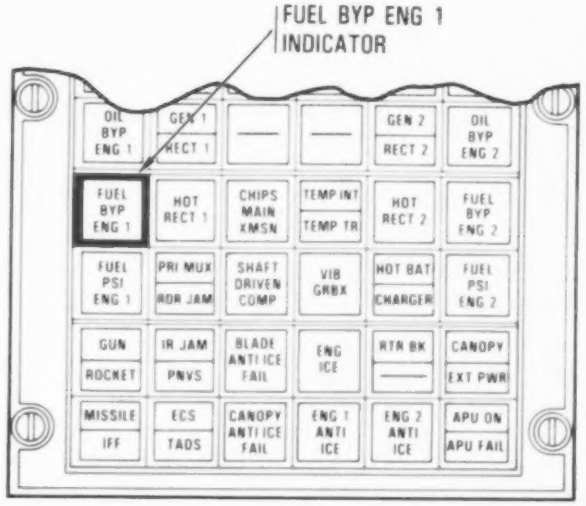
Personnel Required: (para 4-2-13)

References: (para 4-2-13)

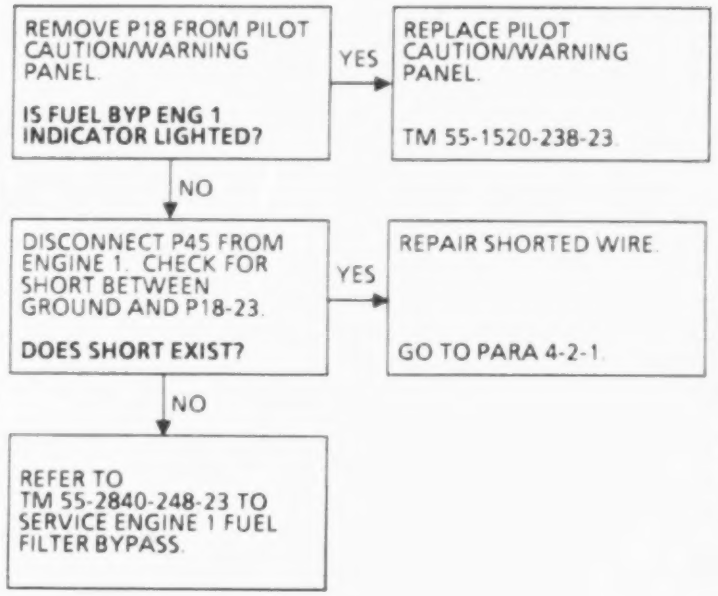
Equipment Conditions: (para 4-2-13)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


FUEL BYP ENG 1 INDICATOR
OIL BYP ENG 1
GEN 1 RECT 1
GEN 2 RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL


REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS FUEL BYP ENG 1 INDICATOR LIGHTED?

YES: REPLACE PILOT CAUTION/WARNING PANEL. TM 55-1520-238-23.

NO: DISCONNECT P45 FROM ENGINE 1. CHECK FOR SHORT BETWEEN GROUND AND P18-23.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 4-2-1.

NO: REFER TO TM 55-2840-248-23 TO SERVICE ENGINE 1 FUEL FILTER BYPASS.

MM04/1-1277

END OF TASK

4-2-16. FUEL PSI ENG 1 INDICATOR - IS LIGHTED

Tools: (para 4-2-13)

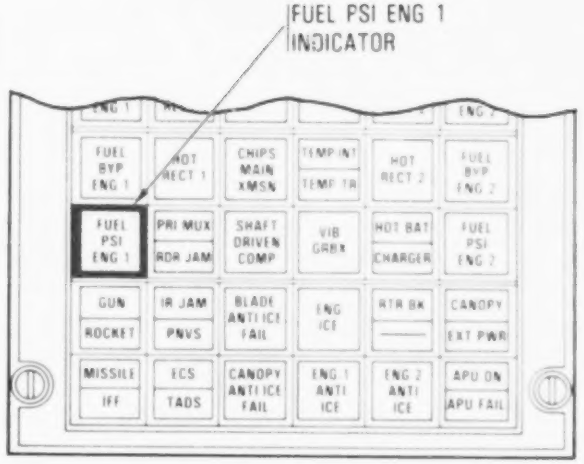
Personnel Required: (para 4-2-13)

References: (para 4-2-13)

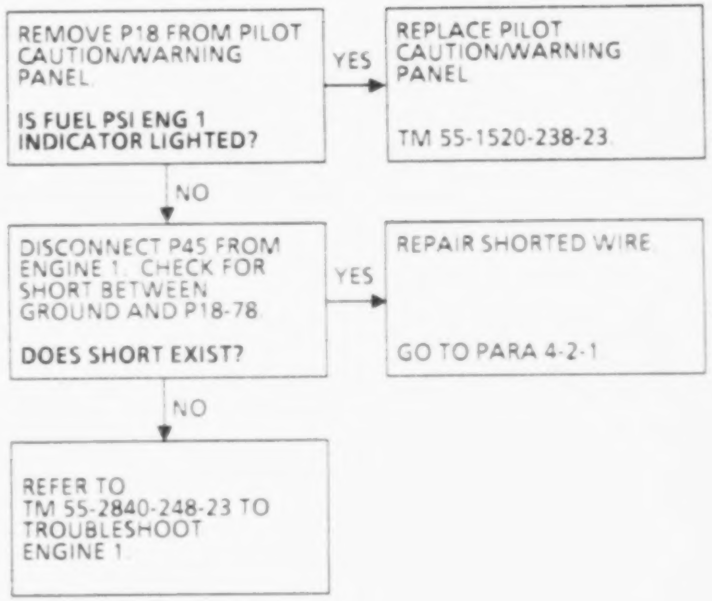
Equipment Conditions: (para 4-2-13)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


FUEL PSI ENG 1 INDICATOR
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL


REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS FUEL PSI ENG 1 INDICATOR LIGHTED?

YES: REPLACE PILOT CAUTION/WARNING PANEL. TM 55-1520-238-23.

NO: DISCONNECT P45 FROM ENGINE 1. CHECK FOR SHORT BETWEEN GROUND AND P18-78.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 4-2-1.

NO: REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.

MM04/1-1278

END OF TASK

4-2-17. CPG ENGINE NO. 1 POWER LEVER - CANNOT BE ADVANCED TO LOCKOUT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

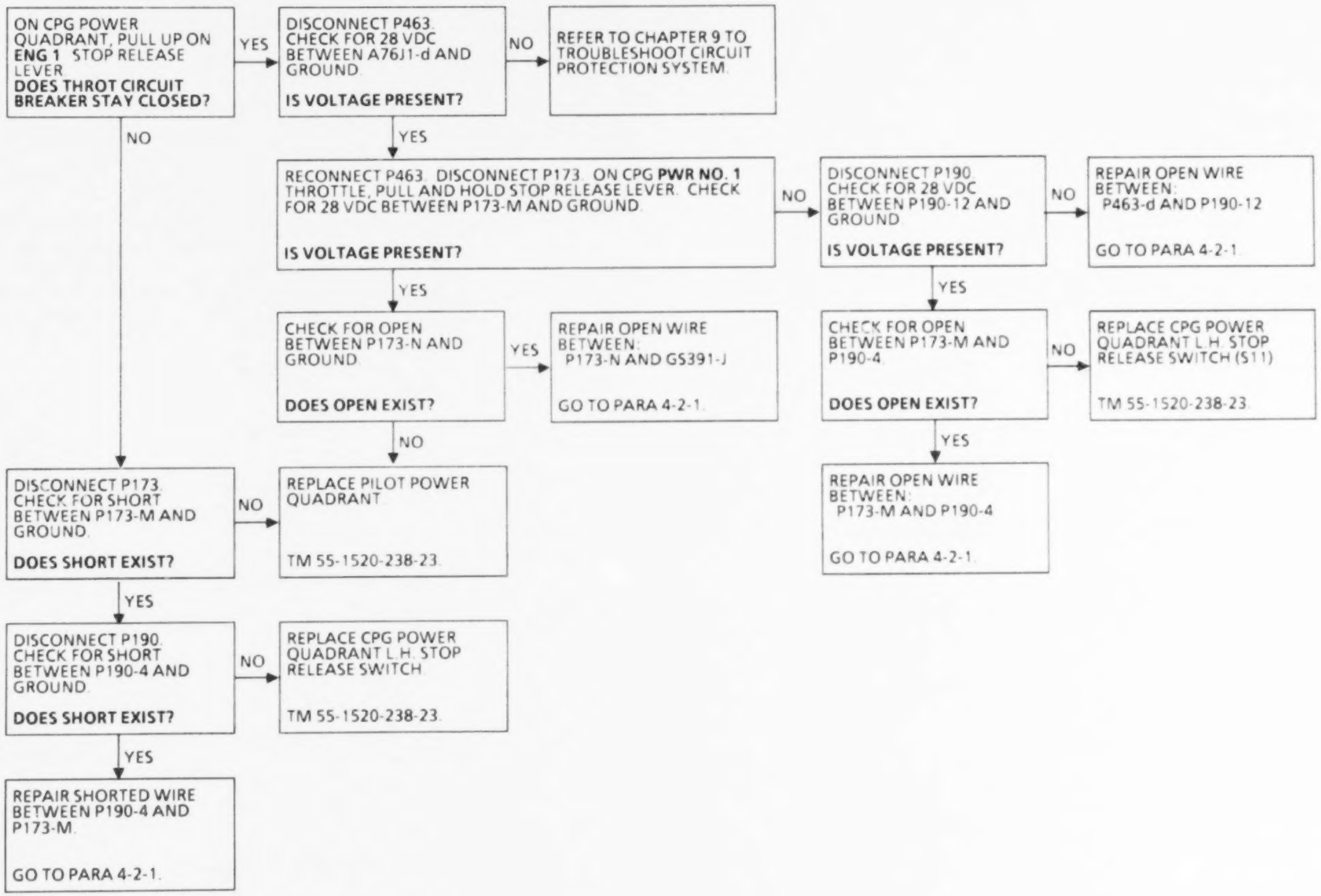
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON CPG POWER QUADRANT, PULL UP ON **ENG 1** STOP RELEASE LEVER. **DOES THROT CIRCUIT BREAKER STAY CLOSED?**

DISCONNECT P463. CHECK FOR 28 VDC BETWEEN A76J1-d AND GROUND. **IS VOLTAGE PRESENT?**

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

RECONNECT P463. DISCONNECT P173. ON CPG **PWR NO. 1** THROTTLE, PULL AND HOLD STOP RELEASE LEVER. CHECK FOR 28 VDC BETWEEN P173-M AND GROUND. **IS VOLTAGE PRESENT?**

DISCONNECT P190. CHECK FOR 28 VDC BETWEEN P190-12 AND GROUND. **IS VOLTAGE PRESENT?**

REPAIR OPEN WIRE BETWEEN: P463-d AND P190-12. GO TO PARA 4-2-1.

CHECK FOR OPEN BETWEEN P173-N AND GROUND. **DOES OPEN EXIST?**

REPAIR OPEN WIRE BETWEEN: P173-N AND GS391-J. GO TO PARA 4-2-1.

CHECK FOR OPEN BETWEEN P173-M AND P190-4. **DOES OPEN EXIST?**

REPLACE CPG POWER QUADRANT L.H. STOP RELEASE SWITCH (S11). TM 55-1520-238-23.

REPLACE PILOT POWER QUADRANT. TM 55-1520-238-23.

REPAIR OPEN WIRE BETWEEN: P173-M AND P190-4. GO TO PARA 4-2-1.

DISCONNECT P173. CHECK FOR SHORT BETWEEN P173-M AND GROUND. **DOES SHORT EXIST?**

DISCONNECT P190. CHECK FOR SHORT BETWEEN P190-4 AND GROUND. **DOES SHORT EXIST?**

REPLACE CPG POWER QUADRANT L.H. STOP RELEASE SWITCH. TM 55-1520-238-23.

REPAIR SHORTED WIRE BETWEEN P190-4 AND P173-M. GO TO PARA 4-2-1.

END OF TASK

4-2-18. PILOT ENGINE CHOP INDICATOR - DOES NOT LIGHT WITH PILOT COLLECTIVE STICK IN CHOP

Tools: (para 4-2-17)

Personnel Required: (para 4-2-17)

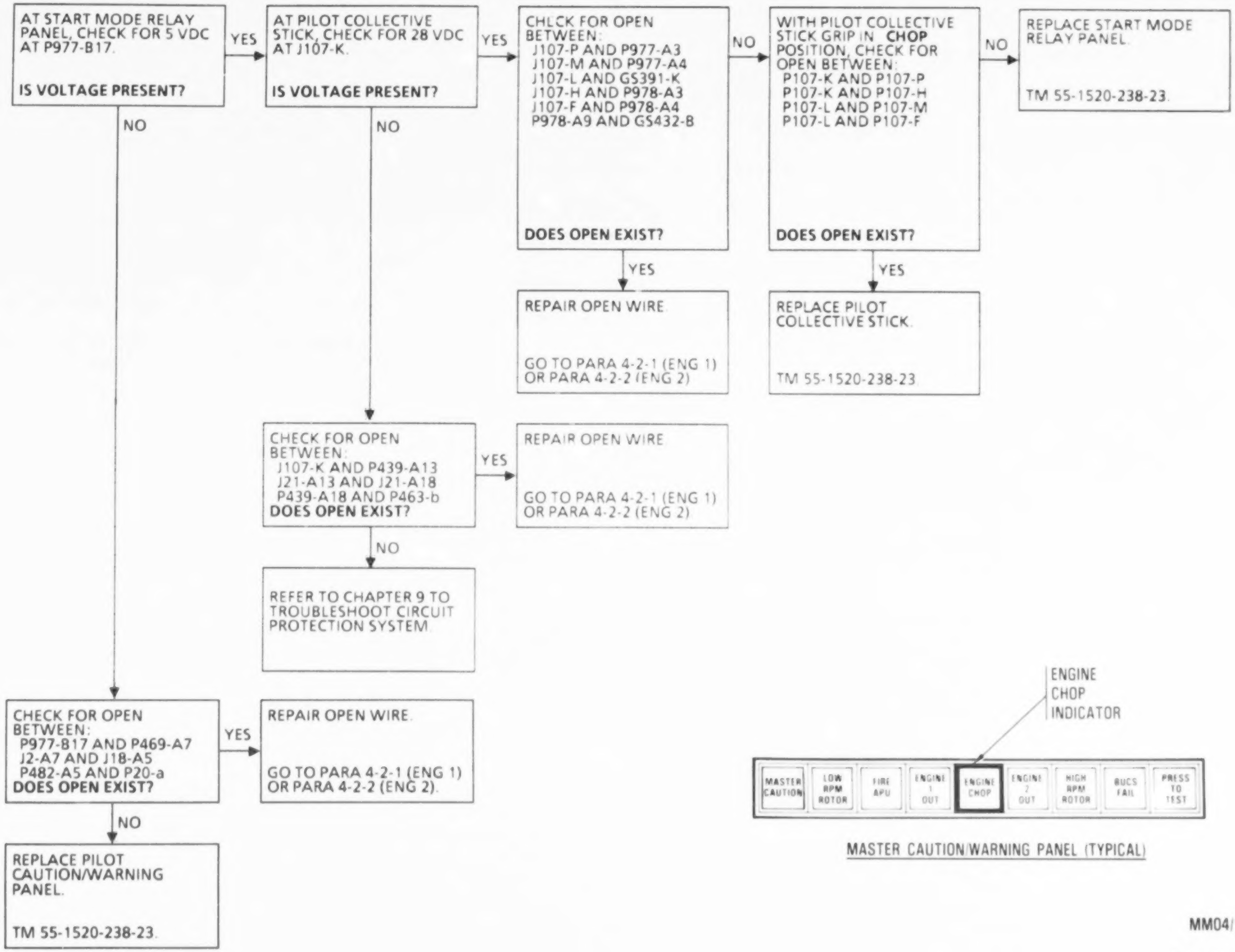
References: (para 4-2-17)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200, R200 panels removed
	Pilot seat removed
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


AT START MODE RELAY PANEL, CHECK FOR 5 VDC AT P977-B17.
IS VOLTAGE PRESENT?
YES
NO
AT PILOT COLLECTIVE STICK, CHECK FOR 28 VDC AT J107-K.
IS VOLTAGE PRESENT?
YES
NO
CHECK FOR OPEN BETWEEN:
J107-P AND P977-A3
J107-M AND P977-A4
J107-L AND GS391-K
J107-H AND P978-A3
J107-F AND P978-A4
P978-A9 AND GS432-B
DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2)
WITH PILOT COLLECTIVE STICK GRIP IN CHOP POSITION, CHECK FOR OPEN BETWEEN:
P107-K AND P107-P
P107-K AND P107-H
P107-L AND P107-M
P107-L AND P107-F
DOES OPEN EXIST?
NO
YES
REPLACE PILOT COLLECTIVE STICK.
TM 55-1520-238-23
REPLACE START MODE RELAY PANEL.
TM 55-1520-238-23.
CHECK FOR OPEN BETWEEN:
J107-K AND P439-A13
J21-A13 AND J21-A18
P439-A18 AND P463-b
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2)
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
CHECK FOR OPEN BETWEEN:
P977-B17 AND P469-A7
J2-A7 AND J18-A5
P482-A5 AND P20-a
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2).
NO
REPLACE PILOT CAUTION/WARNING PANEL.
TM 55-1520-238-23.
ENGINE CHOP INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL (TYPICAL)

MM04/1-1267

END OF TASK

4-2-19. PILOT COLLECTIVE STICK - DOES NOT RESET CHOP FUNCTION

Tools:

Nomenclature	Part Number (NSN)
Tool Kit Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

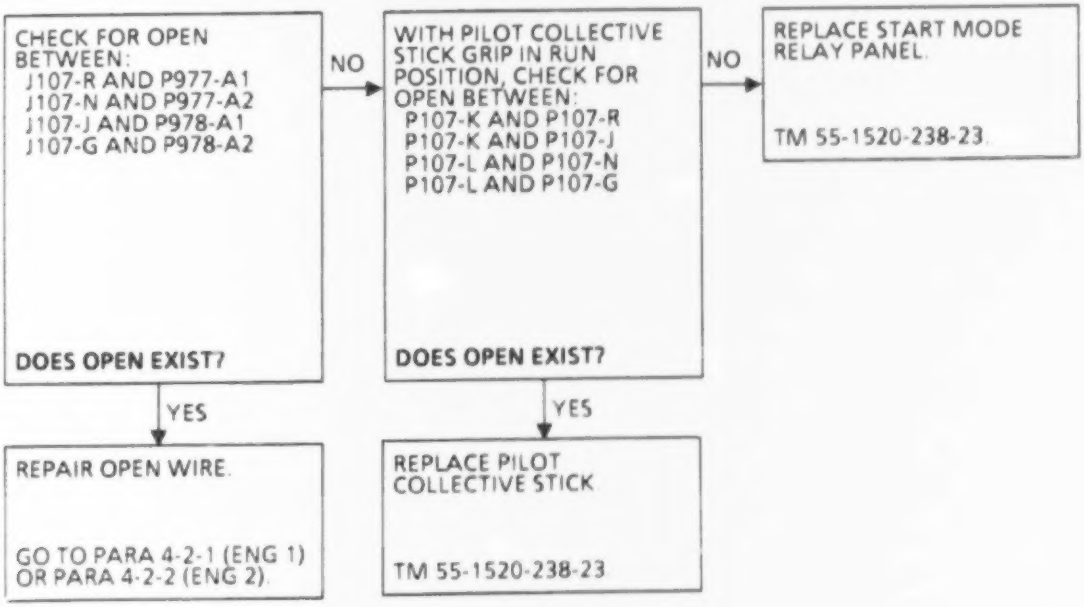
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200, R200 panels removed
	Pilot seat removed



CHECK FOR OPEN BETWEEN:
J107-R AND P977-A1
J107-N AND P977-A2
J107-J AND P978-A1
J107-G AND P978-A2

DOES OPEN EXIST?

WITH PILOT COLLECTIVE STICK GRIP IN RUN POSITION, CHECK FOR OPEN BETWEEN:
P107-K AND P107-R
P107-K AND P107-J
P107-L AND P107-N
P107-L AND P107-G

DOES OPEN EXIST?

REPLACE START MODE RELAY PANEL.

TM 55-1520-238-23.

REPAIR OPEN WIRE.

GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2).

REPLACE PILOT COLLECTIVE STICK.

TM 55-1520-238-23

END OF TASK

4-2-20. CPG ENGINE CHOP INDICATOR - DOES NOT LIGHT WITH CPG COLLECTIVE STICK IN CHOP

Tools: (para 4-2-19)

Personnel Required: (para 4-2-19)

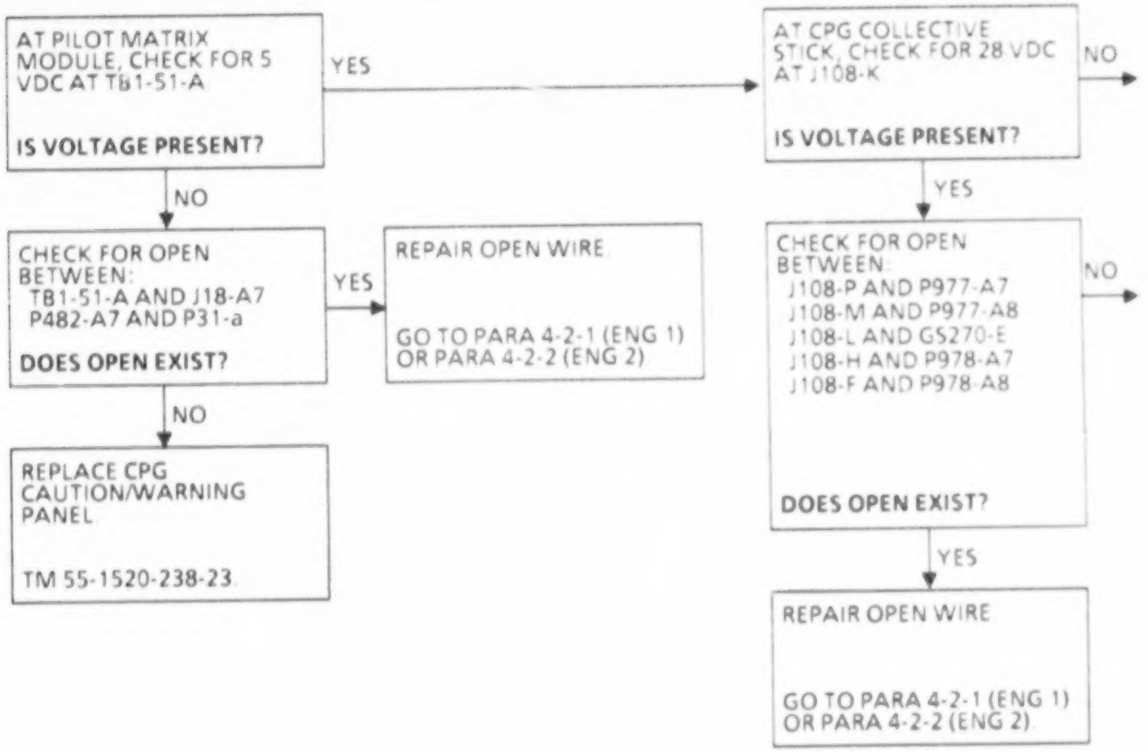
References: (para 4-2-19)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Non-transparent barrier removed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

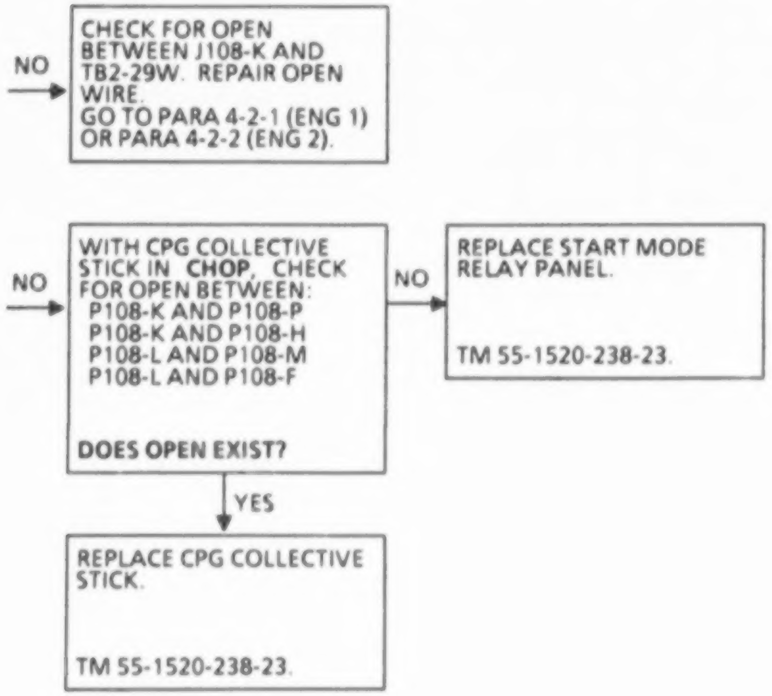
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


AT PILOT MATRIX MODULE, CHECK FOR 5 VDC AT TB1-51-A
IS VOLTAGE PRESENT?
YES
NO
AT CPG COLLECTIVE STICK, CHECK FOR 28 VDC AT J108-K
IS VOLTAGE PRESENT?
NO
YES
CHECK FOR OPEN BETWEEN:
TB1-51-A AND J18-A7
P482-A7 AND P31-a
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2).
NO
REPLACE CPG CAUTION/WARNING PANEL.
TM 55-1520-238-23.
CHECK FOR OPEN BETWEEN:
J108-P AND P977-A7
J108-M AND P977-A8
J108-L AND GS270-E
J108-H AND P978-A7
J108-F AND P978-A8
DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2).

GO TO NEXT PAGE

4-2-20. CPG ENGINE CHOP INDICATOR - DOES NOT LIGHT WITH CPG COLLECTIVE STICK IN CHOP (cont)



CHECK FOR OPEN BETWEEN J108-K AND TB2-29W. REPAIR OPEN WIRE.
GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2).

WITH CPG COLLECTIVE STICK IN **CHOP**, CHECK FOR OPEN BETWEEN:
P108-K AND P108-P
P108-K AND P108-H
P108-L AND P108-M
P108-L AND P108-F

DOES OPEN EXIST?

REPLACE START MODE RELAY PANEL.

TM 55-1520-238-23.

REPLACE CPG COLLECTIVE STICK.

TM 55-1520-238-23.

END OF TASK

4-2-21. CPG COLLECTIVE STICK - DOES NOT RESET CHOP FUNCTION

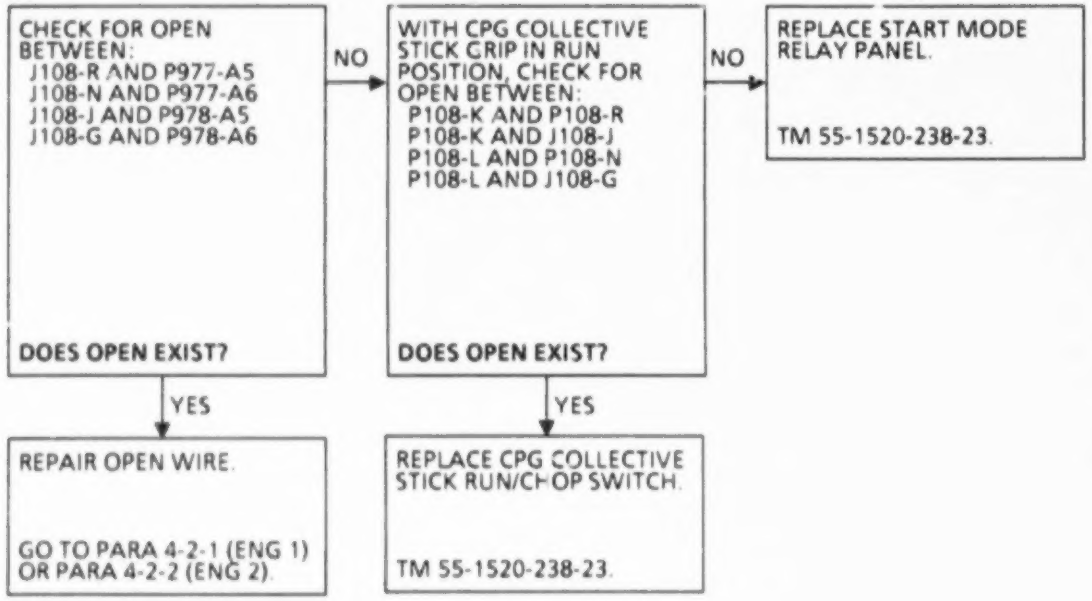
Tools: (para 4-2-19)

Personnel Required: (para 4-2-19)

References: (para 4-2-19)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200, R200 panels removed
	CPG seat removed



CHECK FOR OPEN BETWEEN:
J108-R AND P977-A5
J108-N AND P977-A6
J108-J AND P978-A5
J108-G AND P978-A6

DOES OPEN EXIST?

WITH CPG COLLECTIVE STICK GRIP IN RUN POSITION, CHECK FOR OPEN BETWEEN:
P108-K AND P108-R
P108-K AND J108-J
P108-L AND P108-N
P108-L AND J108-G

DOES OPEN EXIST?

REPLACE START MODE RELAY PANEL.

TM 55-1520-238-23.

REPAIR OPEN WIRE.

GO TO PARA 4-2-1 (ENG 1) OR PARA 4-2-2 (ENG 2).

REPLACE CPG COLLECTIVE STICK RUN/CHOP SWITCH.

TM 55-1520-238-23.

END OF TASK

4-2-22. ENGINE 2 DOES NOT ACCELERATE TO OR REMAIN BETWEEN 23 AND 25 PERCENT N_G IN IGN OVRD

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

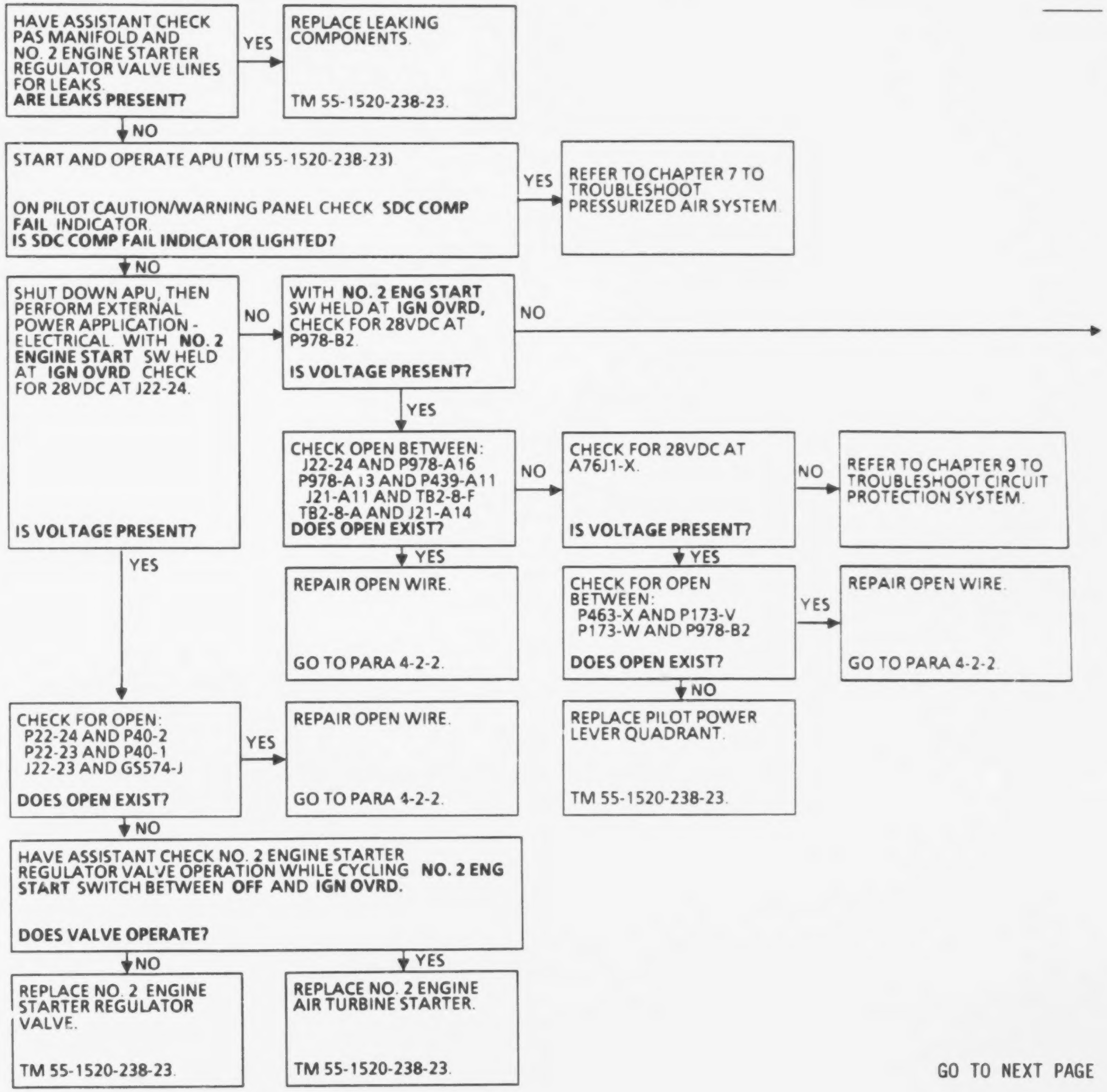
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN1 door opened
	External Power Application - Electrical - Pressurized air
Para 1-3-2	ICS connected

WARNING

- **Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.**
- **During electrical troubleshooting, observe all safety precautions and remove external pressurized air. Failure to do so could result in serious injury.**


HAVE ASSISTANT CHECK PAS MANIFOLD AND NO. 2 ENGINE STARTER REGULATOR VALVE LINES FOR LEAKS. ARE LEAKS PRESENT?
YES
REPLACE LEAKING COMPONENTS. TM 55-1520-238-23.
NO
START AND OPERATE APU (TM 55-1520-238-23) ON PILOT CAUTION/WARNING PANEL CHECK SDC COMP FAIL INDICATOR. IS SDC COMP FAIL INDICATOR LIGHTED?
YES
REFER TO CHAPTER 7 TO TROUBLESHOOT PRESSURIZED AIR SYSTEM.
NO
SHUT DOWN APU, THEN PERFORM EXTERNAL POWER APPLICATION - ELECTRICAL. WITH NO. 2 ENGINE START SW HELD AT IGN OVRD CHECK FOR 28VDC AT J22-24. IS VOLTAGE PRESENT?
NO
WITH NO. 2 ENG START SW HELD AT IGN OVRD, CHECK FOR 28VDC AT P978-B2. IS VOLTAGE PRESENT?
NO
YES
CHECK OPEN BETWEEN: J22-24 AND P978-A16 P978-A13 AND P439-A11 J21-A11 AND TB2-8-F TB2-8-A AND J21-A14 DOES OPEN EXIST?
NO
CHECK FOR 28VDC AT A76J1-X. IS VOLTAGE PRESENT?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
YES
CHECK FOR OPEN BETWEEN: P463-X AND P173-V P173-W AND P978-B2 DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
REPLACE PILOT POWER LEVER QUADRANT. TM 55-1520-238-23.
YES
CHECK FOR OPEN: P22-24 AND P40-2 P22-23 AND P40-1 J22-23 AND GS574-J DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
HAVE ASSISTANT CHECK NO. 2 ENGINE STARTER REGULATOR VALVE OPERATION WHILE CYCLING NO. 2 ENG START SWITCH BETWEEN OFF AND IGN OVRD. DOES VALVE OPERATE?
NO
REPLACE NO. 2 ENGINE STARTER REGULATOR VALVE. TM 55-1520-238-23.
YES
REPLACE NO. 2 ENGINE AIR TURBINE STARTER. TM 55-1520-238-23.

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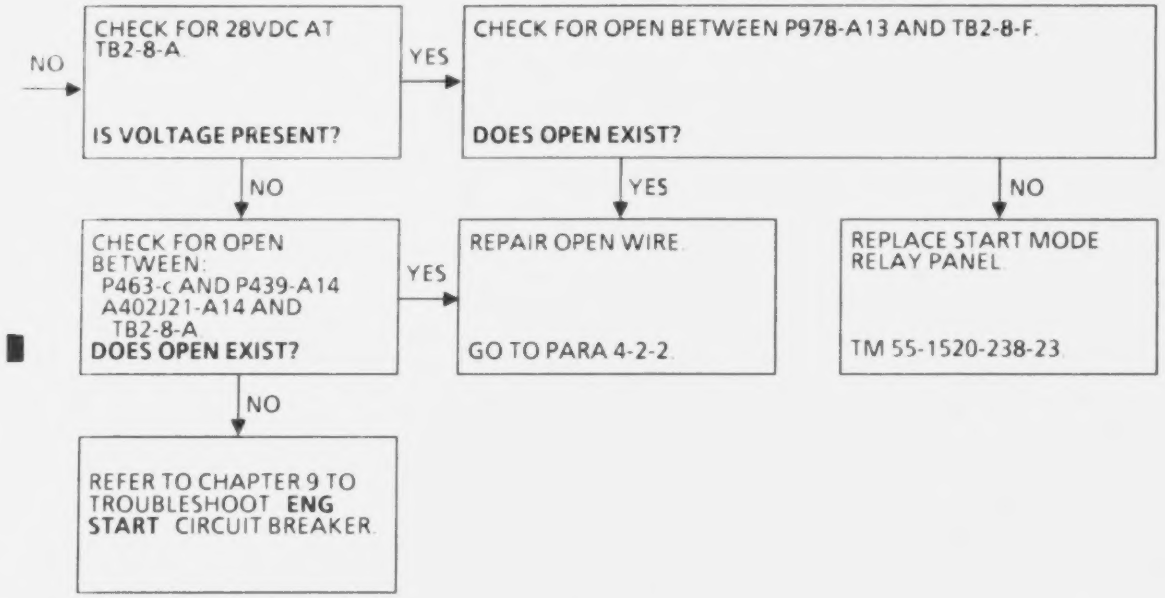
4-2-22. ENGINE 2 DOES NOT ACCELERATE TO OR REMAIN BETWEEN 23 AND 25 PERCENT N_G IN IGN OVRD (cont)


NO
YES
NO
YES
NO
YES
NO

CHECK FOR 28VDC AT TB2-8-A.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN P978-A13 AND TB2-8-F.

DOES OPEN EXIST?

CHECK FOR OPEN BETWEEN:
P463-c AND P439-A14
A402J21-A14 AND TB2-8-A
DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 4-2-2.

REPLACE START MODE RELAY PANEL.

TM 55-1520-238-23.

REFER TO CHAPTER 9 TO TROUBLESHOOT **ENG START** CIRCUIT BREAKER.

END OF TASK

4-2-23. ENG START CIRCUIT BREAKER - DOES NOT STAY CLOSED WITH ENG 2 SWITCH IN START POSITION

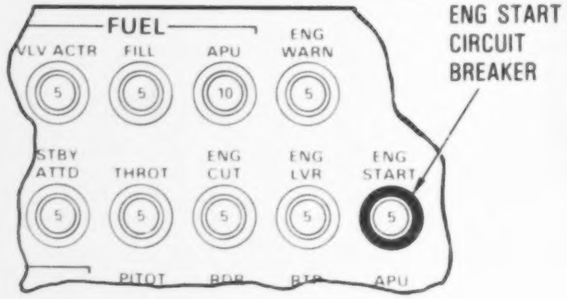
Tools: (para 4-2-22)

Personnel Required: (para 4-2-22)

References: (para 4-2-22)

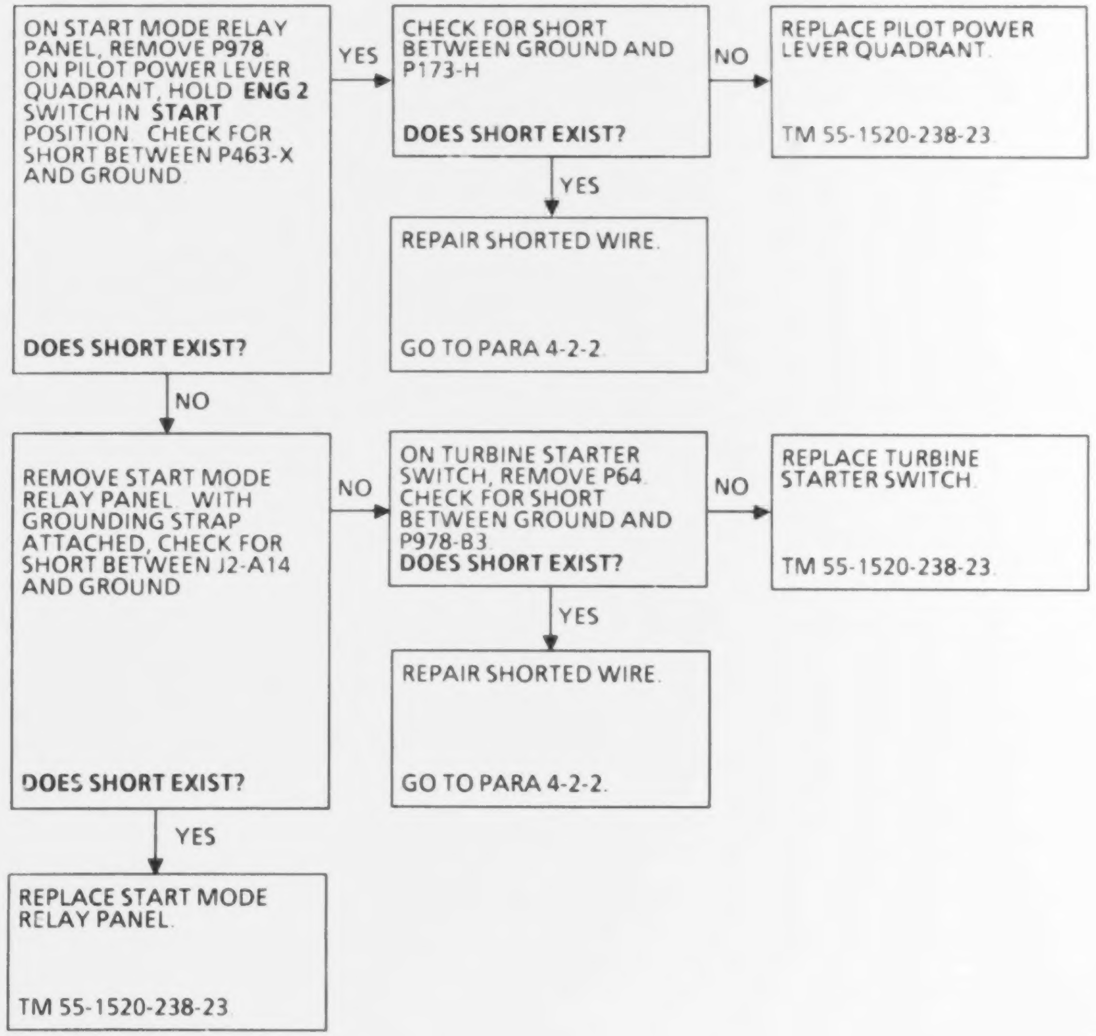
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


FUEL
VLV ACTR
FILL
APU
ENG WARN
5
5
10
5
STBY ATTD
THROT
ENG CUT
ENG LVR
ENG START
5
5
5
5
5
PITOT
RDR
RTR
APU
ENG START CIRCUIT BREAKER

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-1269


YES
NO
YES
NO
NO
NO
YES
YES

ON START MODE RELAY PANEL, REMOVE P978. ON PILOT POWER LEVER QUADRANT, HOLD **ENG 2** SWITCH IN **START** POSITION. CHECK FOR SHORT BETWEEN P463-X AND GROUND.

DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN GROUND AND P173-H.

DOES SHORT EXIST?

REPLACE PILOT POWER LEVER QUADRANT.

TM 55-1520-238-23.

REPAIR SHORTED WIRE.

GO TO PARA 4-2-2.

REMOVE START MODE RELAY PANEL. WITH GROUNDING STRAP ATTACHED, CHECK FOR SHORT BETWEEN J2-A14 AND GROUND.

DOES SHORT EXIST?

ON TURBINE STARTER SWITCH, REMOVE P64. CHECK FOR SHORT BETWEEN GROUND AND P978-B3.
DOES SHORT EXIST?

REPLACE TURBINE STARTER SWITCH.

TM 55-1520-238-23.

REPAIR SHORTED WIRE.

GO TO PARA 4-2-2.

REPLACE START MODE RELAY PANEL.

TM 55-1520-238-23.

END OF TASK

4-2-24. ENG START ENG 2 INDICATOR - IS NOT LIGHTED WITH ENGINE 2 STARTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

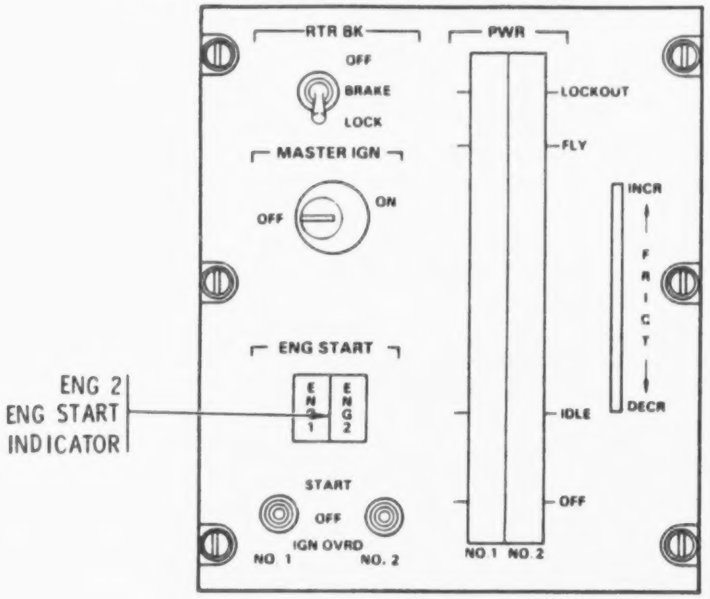
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN1 door opened
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

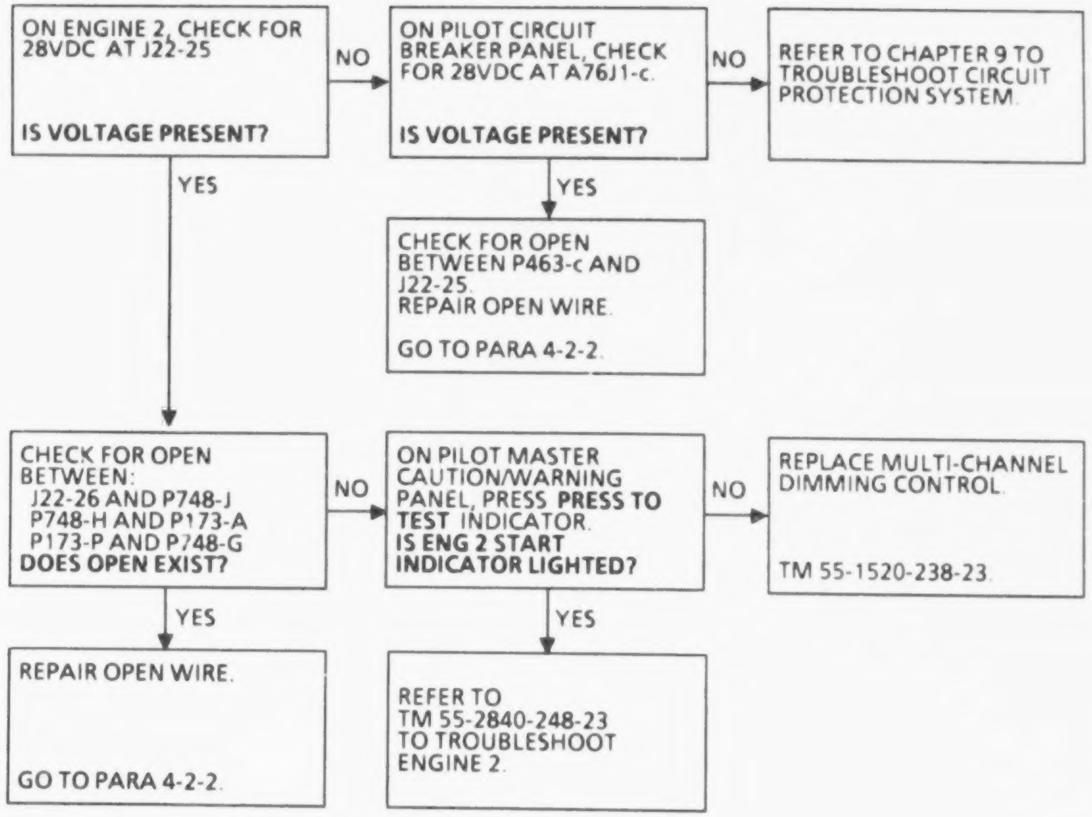
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO. 1
NO. 2
PWR
LOCKOUT
FLY
IDLE
OFF
NO 1
NO 2
INCR
FRICT
DECR
ENG 2
ENG START
INDICATOR

MM04/1-1260A

PILOT POWER QUADRANT PANEL



ON ENGINE 2, CHECK FOR 28VDC AT J22-25

IS VOLTAGE PRESENT?

NO → ON PILOT CIRCUIT BREAKER PANEL, CHECK FOR 28VDC AT A76J1-c.

IS VOLTAGE PRESENT?

NO → REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

YES → CHECK FOR OPEN BETWEEN P463-c AND J22-25.
REPAIR OPEN WIRE.

GO TO PARA 4-2-2.

YES → CHECK FOR OPEN BETWEEN:
J22-26 AND P748-J
P748-H AND P173-A
P173-P AND P748-G
DOES OPEN EXIST?

YES → REPAIR OPEN WIRE.

GO TO PARA 4-2-2.

NO → ON PILOT MASTER CAUTION/WARNING PANEL, PRESS **PRESS TO TEST** INDICATOR.
IS ENG 2 START INDICATOR LIGHTED?

YES → REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

NO → REPLACE MULTI-CHANNEL DIMMING CONTROL.

TM 55-1520-238-23.

END OF TASK

4-2-25. ENG START ENG 2 INDICATOR - REMAINS LIGHTED ABOVE 52% N_G

Tools: (para 4-2-24)

Personnel Required: (para 4-2-24)

References:

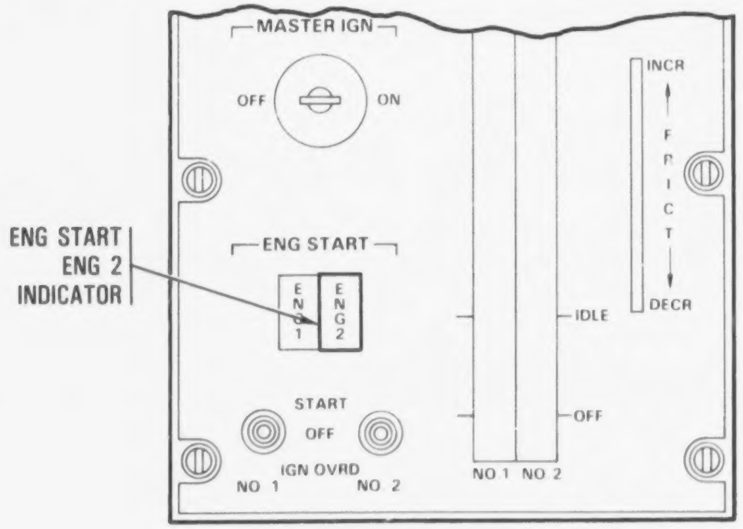
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 panel removed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

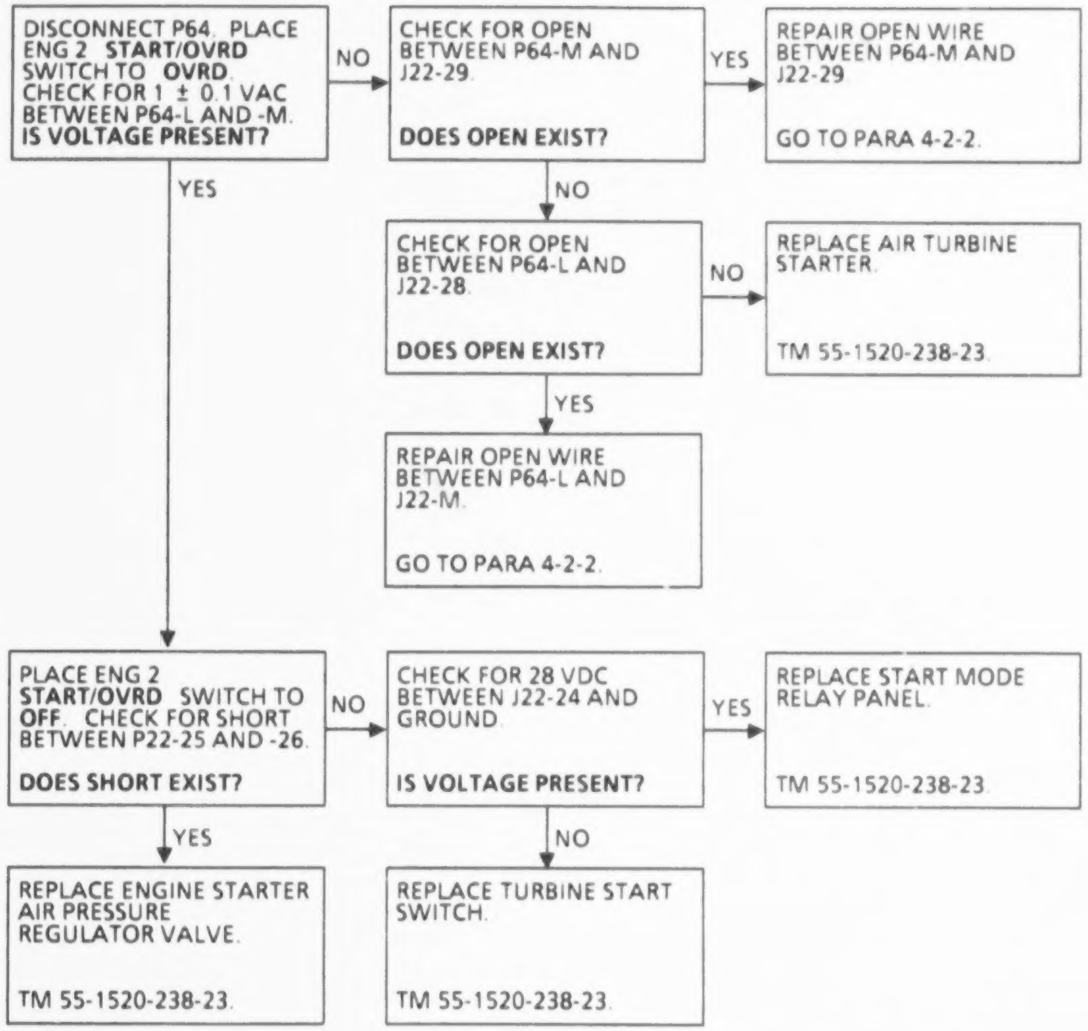
WARNING

- Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.
- During electrical troubleshooting, observe all safety precautions and remove external pressurized air. Failure to do so could result in death of serious injury due to main rotor blade rotation.



PILOT POWER QUADRANT PANEL

MM04/1-1268A



DISCONNECT P64. PLACE ENG 2 **START/OVRD** SWITCH TO **OVRD**. CHECK FOR 1 ± 0.1 VAC BETWEEN P64-L AND -M. **IS VOLTAGE PRESENT?**

CHECK FOR OPEN BETWEEN P64-M AND J22-29. **DOES OPEN EXIST?**

REPAIR OPEN WIRE BETWEEN P64-M AND J22-29. GO TO PARA 4-2-2.

CHECK FOR OPEN BETWEEN P64-L AND J22-28. **DOES OPEN EXIST?**

REPLACE AIR TURBINE STARTER. TM 55-1520-238-23.

REPAIR OPEN WIRE BETWEEN P64-L AND J22-M. GO TO PARA 4-2-2.

PLACE ENG 2 **START/OVRD** SWITCH TO **OFF**. CHECK FOR SHORT BETWEEN P22-25 AND -26. **DOES SHORT EXIST?**

CHECK FOR 28 VDC BETWEEN J22-24 AND GROUND. **IS VOLTAGE PRESENT?**

REPLACE START MODE RELAY PANEL. TM 55-1520-238-23.

REPLACE ENGINE STARTER AIR PRESSURE REGULATOR VALVE. TM 55-1520-238-23.

REPLACE TURBINE START SWITCH. TM 55-1520-238-23.

END OF TASK

4-2-26. ENGINE 2 OUT INDICATORS - ARE LIGHTED WITH ENGINE 2 RUNNING

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

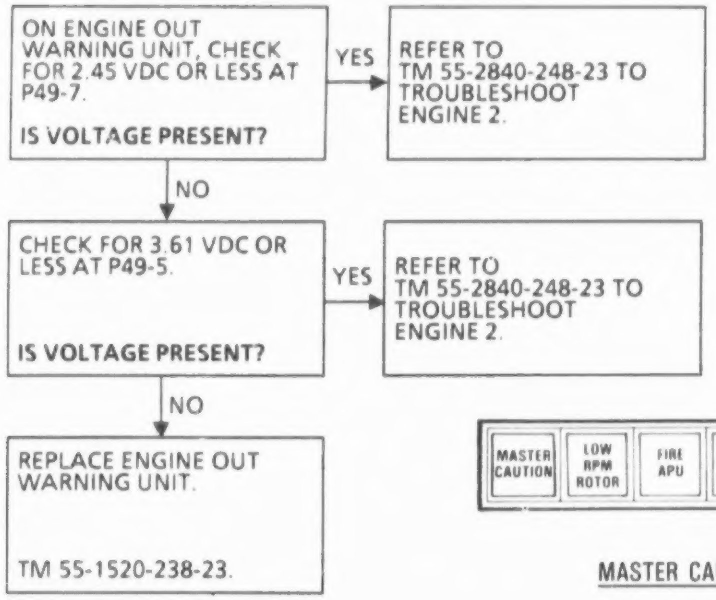
TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L140 fairing removed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON ENGINE OUT WARNING UNIT, CHECK FOR 2.45 VDC OR LESS AT P49-7.

IS VOLTAGE PRESENT?

YES: REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

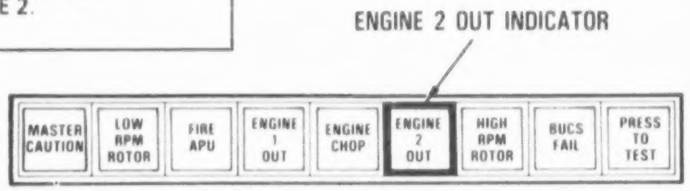
NO: CHECK FOR 3.61 VDC OR LESS AT P49-5.

IS VOLTAGE PRESENT?

YES: REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

NO: REPLACE ENGINE OUT WARNING UNIT.

TM 55-1520-238-23.



MASTER CAUTION/WARNING PANEL (TYPICAL)   MM04/1-1261

END OF TASK

4-2-27. ENGINE 2 N_G - DOES NOT REMAIN STABLE WITH CKT A SWITCH CLOSED

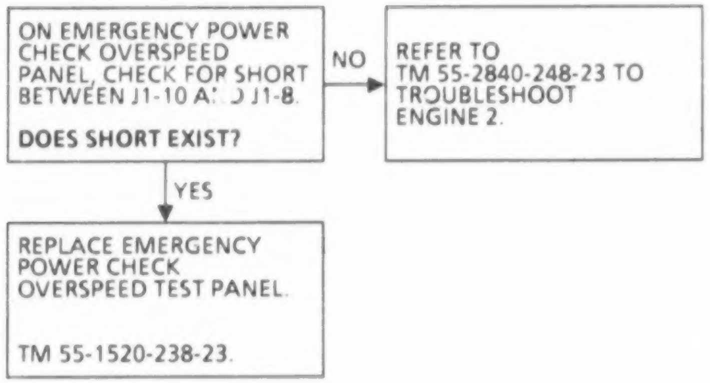
Tools: (para 4-2-26)

Personnel Required: (para 4-2-26)

References: (para 4-2-26)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



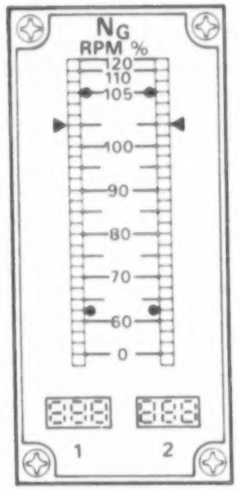
ON EMERGENCY POWER CHECK OVERSPEED PANEL, CHECK FOR SHORT BETWEEN J1-10 AND J1-8.

DOES SHORT EXIST?

NO: REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

YES: REPLACE EMERGENCY POWER CHECK OVERSPEED TEST PANEL.

TM 55-1520-238-23.



ENGINE GAS GENERATOR INDICATOR

MM04/1-1262

END OF TASK

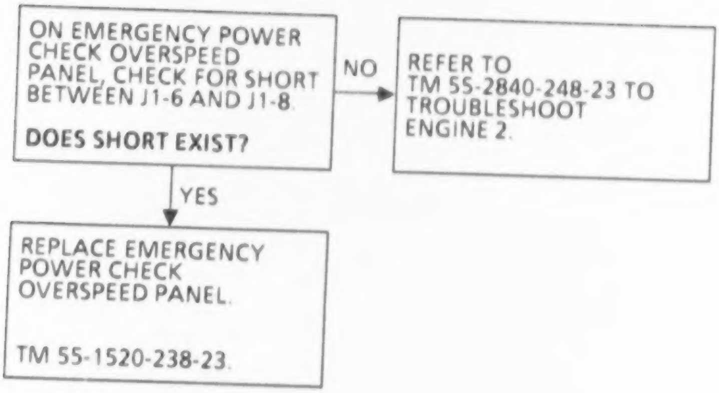
4-2-28. ENGINE 2 N_G - DOES NOT REMAIN STABLE WITH CKT B SWITCH CLOSED

Tools: (para 4-2-26)

Personnel Required: (para 4-2-26)

References: (para 4-2-26)

Equipment Conditions: (para 4-2-26)


ON EMERGENCY POWER CHECK OVERSPEED PANEL, CHECK FOR SHORT BETWEEN J1-6 AND J1-8.
DOES SHORT EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.
YES
REPLACE EMERGENCY POWER CHECK OVERSPEED PANEL.
TM 55-1520-238-23.

END OF TASK

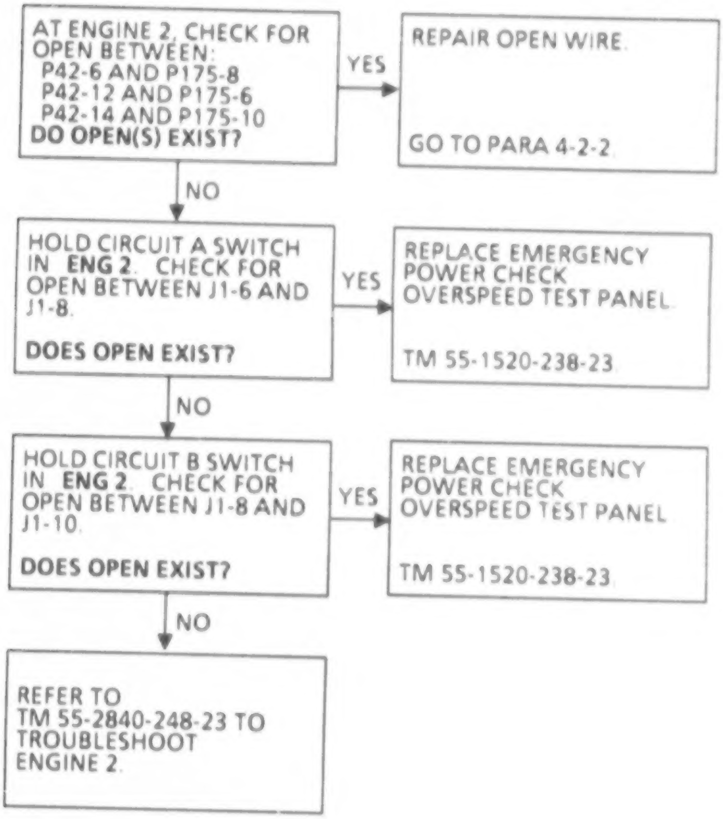
4-2-29. ENGINE 2 N_G - DOES NOT DECREASE WITH CKT A AND CKT B SWITCHES CLOSED

Tools: (para 4-2-26)

Personnel Required: (para 4-2-26)

References: (para 4-2-26)

Equipment Conditions: (para 4-2-26)


AT ENGINE 2, CHECK FOR OPEN BETWEEN:
P42-6 AND P175-8
P42-12 AND P175-6
P42-14 AND P175-10
DO OPEN(S) EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-2.
NO
HOLD CIRCUIT A SWITCH IN ENG 2. CHECK FOR OPEN BETWEEN J1-6 AND J1-8.
DOES OPEN EXIST?
YES
REPLACE EMERGENCY POWER CHECK OVERSPEED TEST PANEL.
TM 55-1520-238-23.
NO
HOLD CIRCUIT B SWITCH IN ENG 2. CHECK FOR OPEN BETWEEN J1-8 AND J1-10.
DOES OPEN EXIST?
YES
REPLACE EMERGENCY POWER CHECK OVERSPEED TEST PANEL
TM 55-1520-238-23.
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

END OF TASK

4-2-30. CHIPS ENG 2 INDICATOR - IS LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

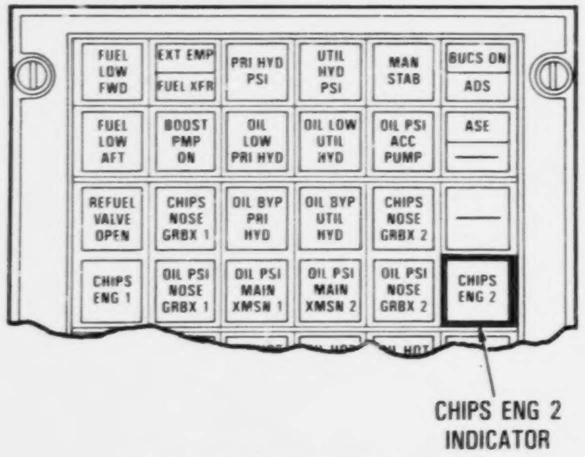
TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

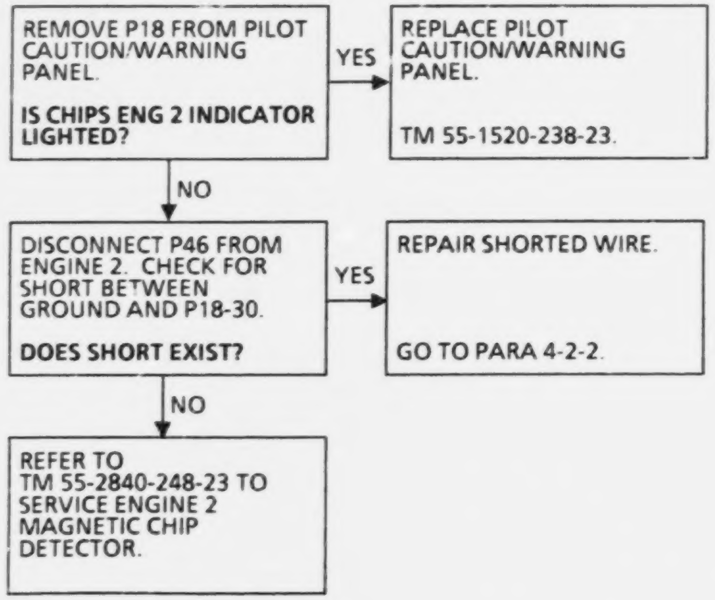
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
CHIPS ENG 2 INDICATOR

PILOT CAUTION/WARNING PANEL

MM04/1-1266


REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS CHIPS ENG 2 INDICATOR LIGHTED?

YES: REPLACE PILOT CAUTION/WARNING PANEL.

TM 55-1520-238-23.

NO: DISCONNECT P46 FROM ENGINE 2. CHECK FOR SHORT BETWEEN GROUND AND P18-30.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE.

GO TO PARA 4-2-2.

NO: REFER TO TM 55-2840-248-23 TO SERVICE ENGINE 2 MAGNETIC CHIP DETECTOR.

END OF TASK

4-2-31. OIL BYP ENG 2 INDICATOR - IS LIGHTED

Tools: (para 4-2-30)

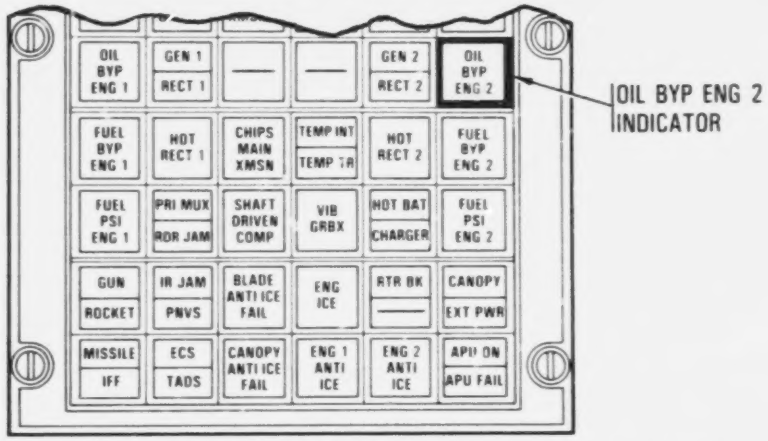
Personnel Required: (para 4-2-30)

References: (para 4-2-30)

Equipment Conditions: (para 4-2-30)

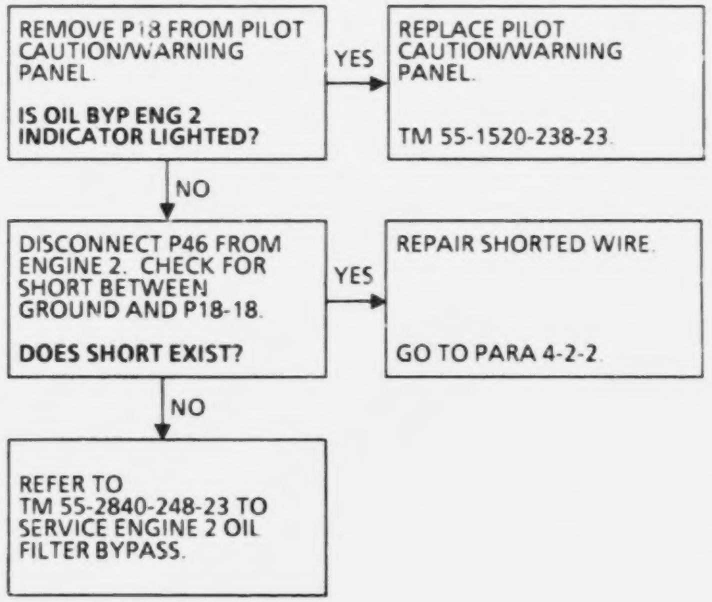
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL
OIL BYP ENG 2 INDICATOR

PILOT CAUTION/WARNING PANEL

MM04/1-1263


REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS OIL BYP ENG 2 INDICATOR LIGHTED?

YES: REPLACE PILOT CAUTION/WARNING PANEL.

TM 55-1520-238-23.

NO: DISCONNECT P46 FROM ENGINE 2. CHECK FOR SHORT BETWEEN GROUND AND P18-18.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE.

GO TO PARA 4-2-2.

NO: REFER TO TM 55-2840-248-23 TO SERVICE ENGINE 2 OIL FILTER BYPASS.

END OF TASK

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4-2-32. FUEL BYP ENG 2 INDICATOR - IS LIGHTED

Tools: (para 4-2-30)

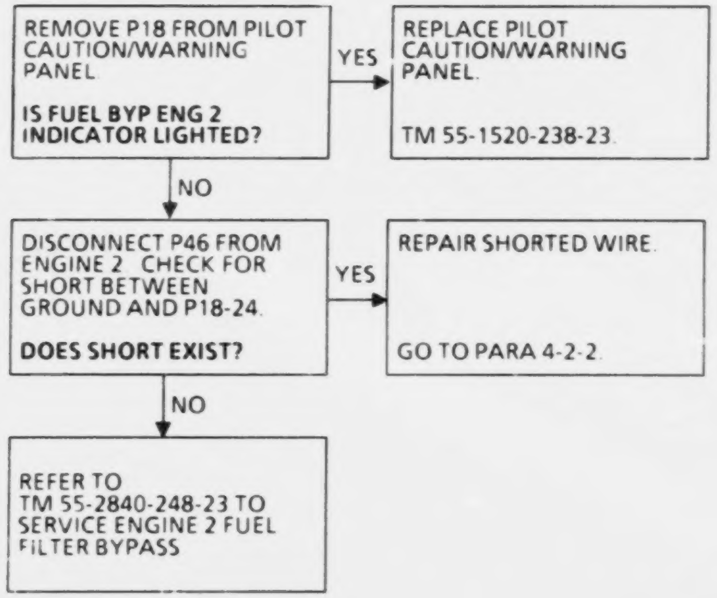
Personnel Required: (para 4-2-30)

References: (para 4-2-30)

Equipment Conditions: (para 4-2-30)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS FUEL BYP ENG 2 INDICATOR LIGHTED?

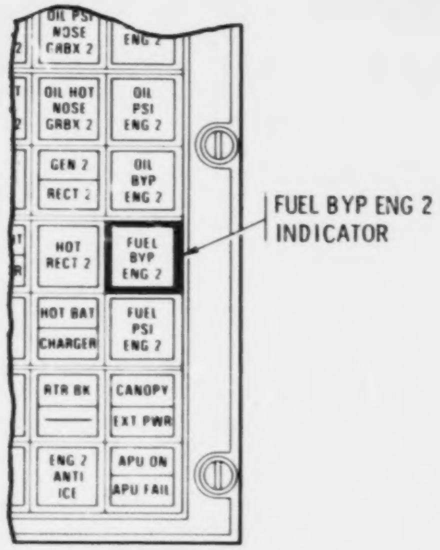
YES: REPLACE PILOT CAUTION/WARNING PANEL. TM 55-1520-238-23.

NO: DISCONNECT P46 FROM ENGINE 2. CHECK FOR SHORT BETWEEN GROUND AND P18-24.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 4-2-2.

NO: REFER TO TM 55-2840-248-23 TO SERVICE ENGINE 2 FUEL FILTER BYPASS


OIL PSI NOSE GRBX 2
ENG 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
GEN 2
RECT 2
OIL BYP ENG 2
HOT RECT 2
FUEL BYP ENG 2
HOT BAT
CHARGER
FUEL PSI ENG 2
RTR BK
CANOPY
EXT PWR
ENG 2 ANTI ICE
APU ON
APU FAIL
FUEL BYP ENG 2 INDICATOR

PILOT CAUTION/WARNING PANEL

MM04/1-1360

END OF TASK

4-2-33. FUEL PSI ENG 2 INDICATOR - IS LIGHTED

Tools: (para 4-2-30)

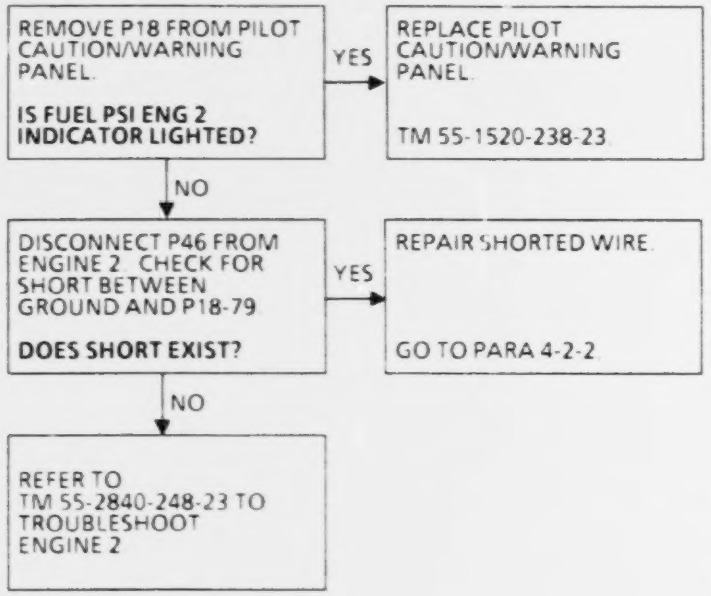
Personnel Required: (para 4-2-30)

References: (para 4-2-30)

Equipment Conditions: (para 4-2-30)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS FUEL PSI ENG 2 INDICATOR LIGHTED?

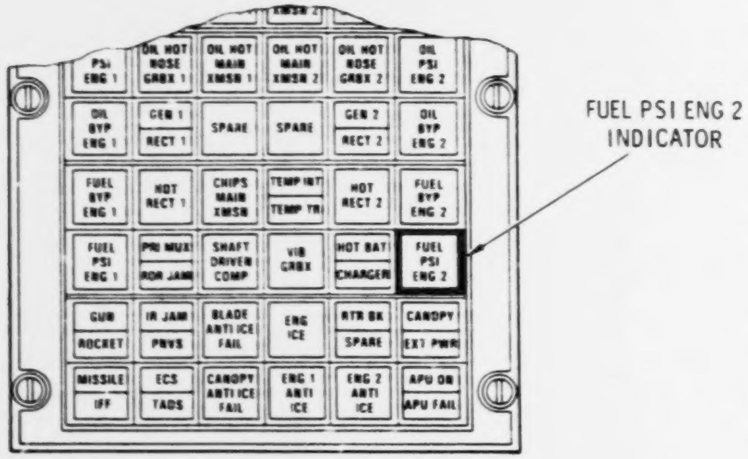
YES: REPLACE PILOT CAUTION/WARNING PANEL. TM 55-1520-238-23

NO: DISCONNECT P46 FROM ENGINE 2. CHECK FOR SHORT BETWEEN GROUND AND P18-79.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 4-2-2.

NO: REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2


XMSN 2
PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
SPARE
SPARE
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
SPARE
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL
FUEL PSI ENG 2 INDICATOR

PILOT CAUTION / WARNING PANEL

MM04/1-1265

END OF TASK

4-2-34. CPG ENGINE NO. 2 POWER LEVER - CANNOT BE ADVANCED TO LOCKOUT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

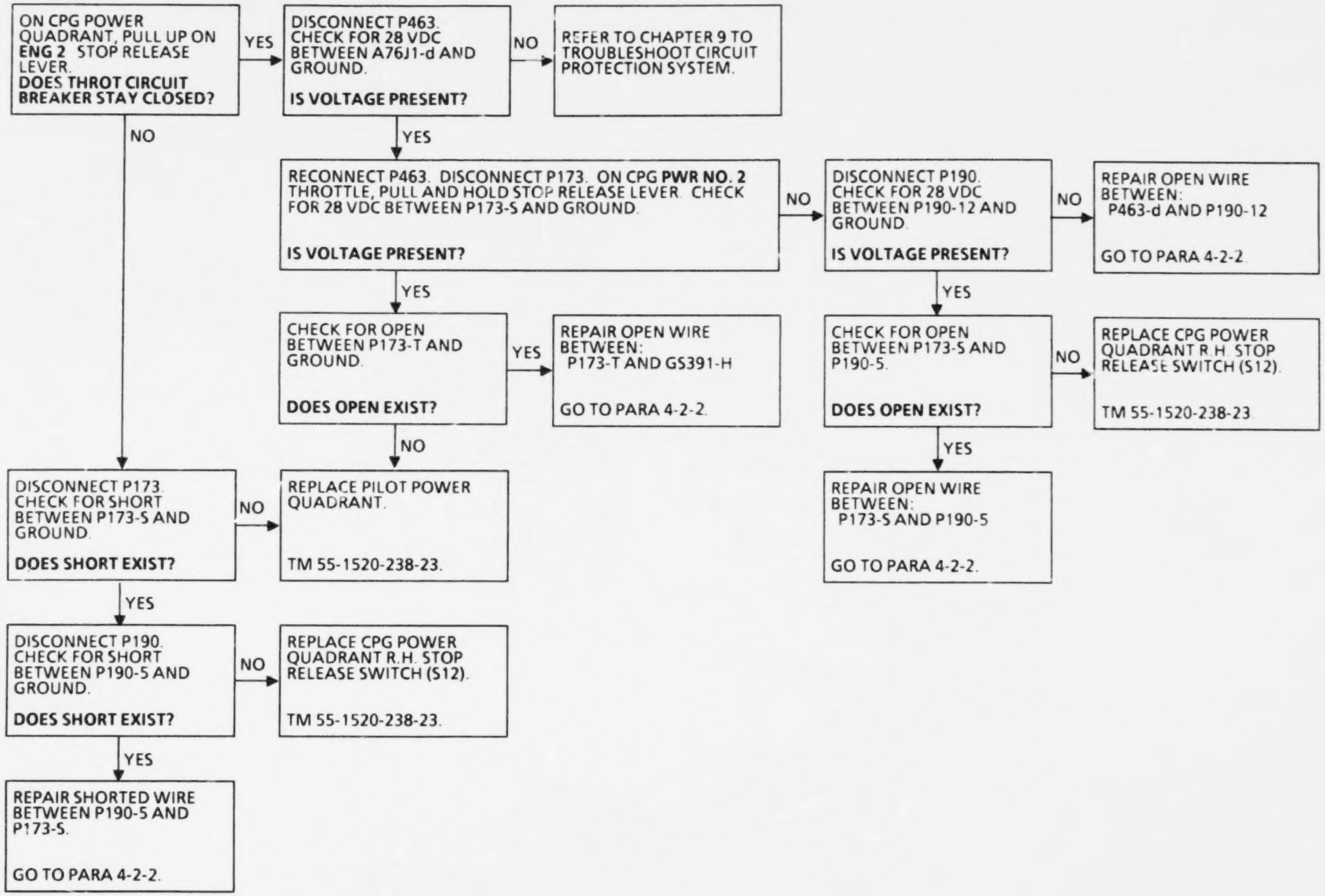
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON CPG POWER QUADRANT, PULL UP ON **ENG 2** STOP RELEASE LEVER. **DOES THROT CIRCUIT BREAKER STAY CLOSED?**

DISCONNECT P463. CHECK FOR 28 VDC BETWEEN A76J1-d AND GROUND. **IS VOLTAGE PRESENT?**

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

RECONNECT P463. DISCONNECT P173. ON CPG **PWR NO. 2** THROTTLE, PULL AND HOLD STOP RELEASE LEVER. CHECK FOR 28 VDC BETWEEN P173-S AND GROUND. **IS VOLTAGE PRESENT?**

DISCONNECT P190. CHECK FOR 28 VDC BETWEEN P190-12 AND GROUND. **IS VOLTAGE PRESENT?**

REPAIR OPEN WIRE BETWEEN: P463-d AND P190-12. GO TO PARA 4-2-2.

CHECK FOR OPEN BETWEEN P173-T AND GROUND. **DOES OPEN EXIST?**

REPAIR OPEN WIRE BETWEEN: P173-T AND GS391-H. GO TO PARA 4-2-2.

CHECK FOR OPEN BETWEEN P173-S AND P190-5. **DOES OPEN EXIST?**

REPLACE CPG POWER QUADRANT R.H. STOP RELEASE SWITCH (S12). TM 55-1520-238-23.

REPLACE PILOT POWER QUADRANT. TM 55-1520-238-23.

REPAIR OPEN WIRE BETWEEN: P173-S AND P190-5. GO TO PARA 4-2-2.

DISCONNECT P173. CHECK FOR SHORT BETWEEN P173-S AND GROUND. **DOES SHORT EXIST?**

DISCONNECT P190. CHECK FOR SHORT BETWEEN P190-5 AND GROUND. **DOES SHORT EXIST?**

REPLACE CPG POWER QUADRANT R.H. STOP RELEASE SWITCH (S12). TM 55-1520-238-23.

REPAIR SHORTED WIRE BETWEEN P190-5 AND P173-S. GO TO PARA 4-2-2.

END OF TASK

4-2-35. ENGINE NO. 1 - DOES NOT START

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
100KG Pilot

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

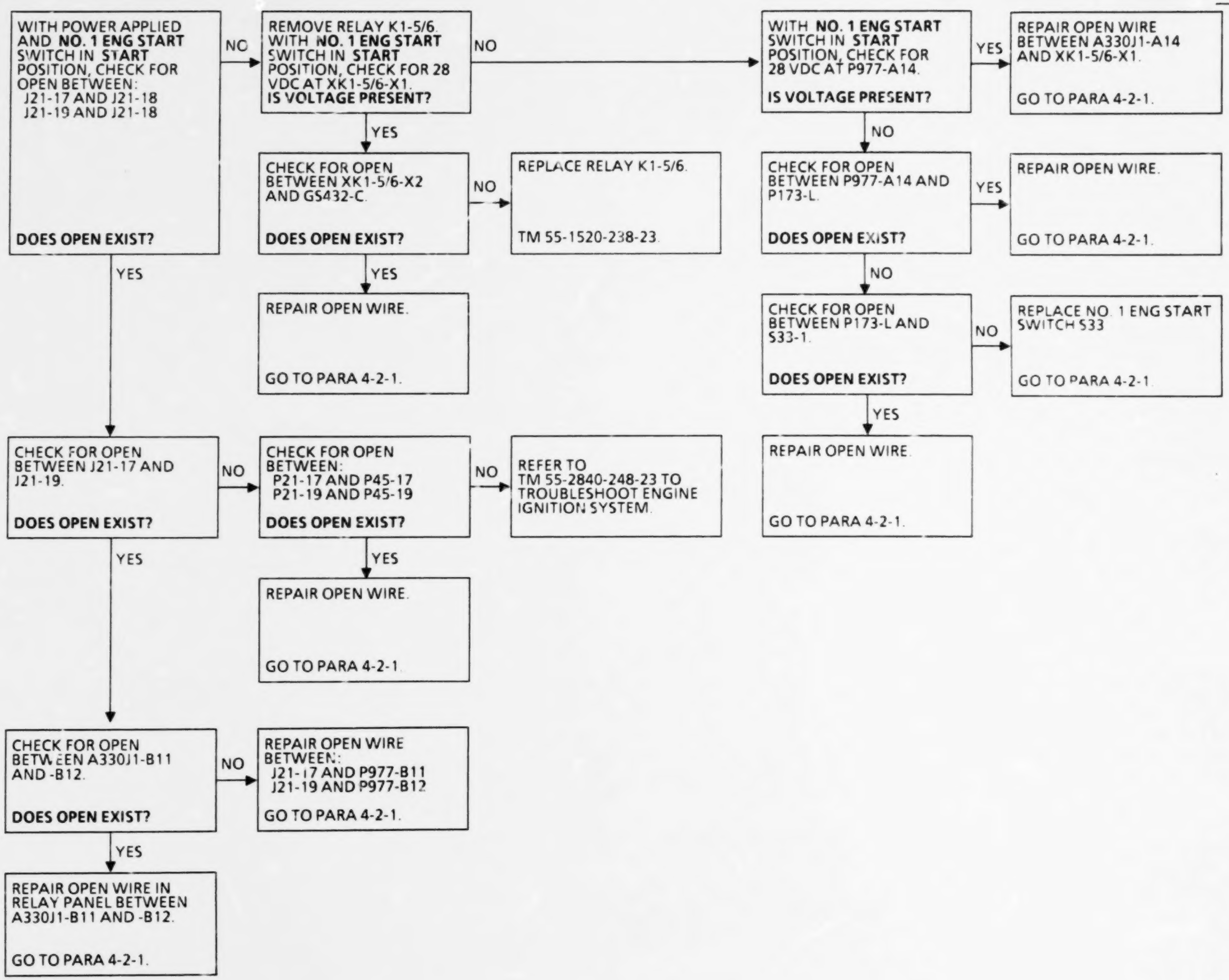
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 4-1-2	POWER PLANTS - POWER UP completed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

NOTE

Disconnect P21 and leave it disconnected while performing this troubleshooting procedure.


WITH POWER APPLIED AND NO. 1 ENG START SWITCH IN START POSITION, CHECK FOR OPEN BETWEEN: J21-17 AND J21-18 J21-19 AND J21-18 DOES OPEN EXIST?
NO
REMOVE RELAY K1-5/6. WITH NO. 1 ENG START SWITCH IN START POSITION, CHECK FOR 28 VDC AT XK1-5/6-X1. IS VOLTAGE PRESENT?
NO
WITH NO. 1 ENG START SWITCH IN START POSITION, CHECK FOR 28 VDC AT P977-A14. IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN A330J1-A14 AND XK1-5/6-X1. GO TO PARA 4-2-1.
YES
CHECK FOR OPEN BETWEEN XK1-5/6-X2 AND GS432-C. DOES OPEN EXIST?
NO
REPLACE RELAY K1-5/6. TM 55-1520-238-23.
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN P977-A14 AND P173-L. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN P173-L AND S33-1. DOES OPEN EXIST?
NO
REPLACE NO. 1 ENG START SWITCH S33 GO TO PARA 4-2-1.
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
YES
CHECK FOR OPEN BETWEEN J21-17 AND J21-19. DOES OPEN EXIST?
NO
CHECK FOR OPEN BETWEEN: P21-17 AND P45-17 P21-19 AND P45-19 DOES OPEN EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE IGNITION SYSTEM.
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
YES
CHECK FOR OPEN BETWEEN A330J1-B11 AND -B12. DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN: J21-17 AND P977-B11 J21-19 AND P977-B12 GO TO PARA 4-2-1.
YES
REPAIR OPEN WIRE IN RELAY PANEL BETWEEN A330J1-B11 AND -B12. GO TO PARA 4-2-1.

END OF TASK

4-2-36. ENGINE NO. 2 - DOES NOT START

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
100KG Pilot

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

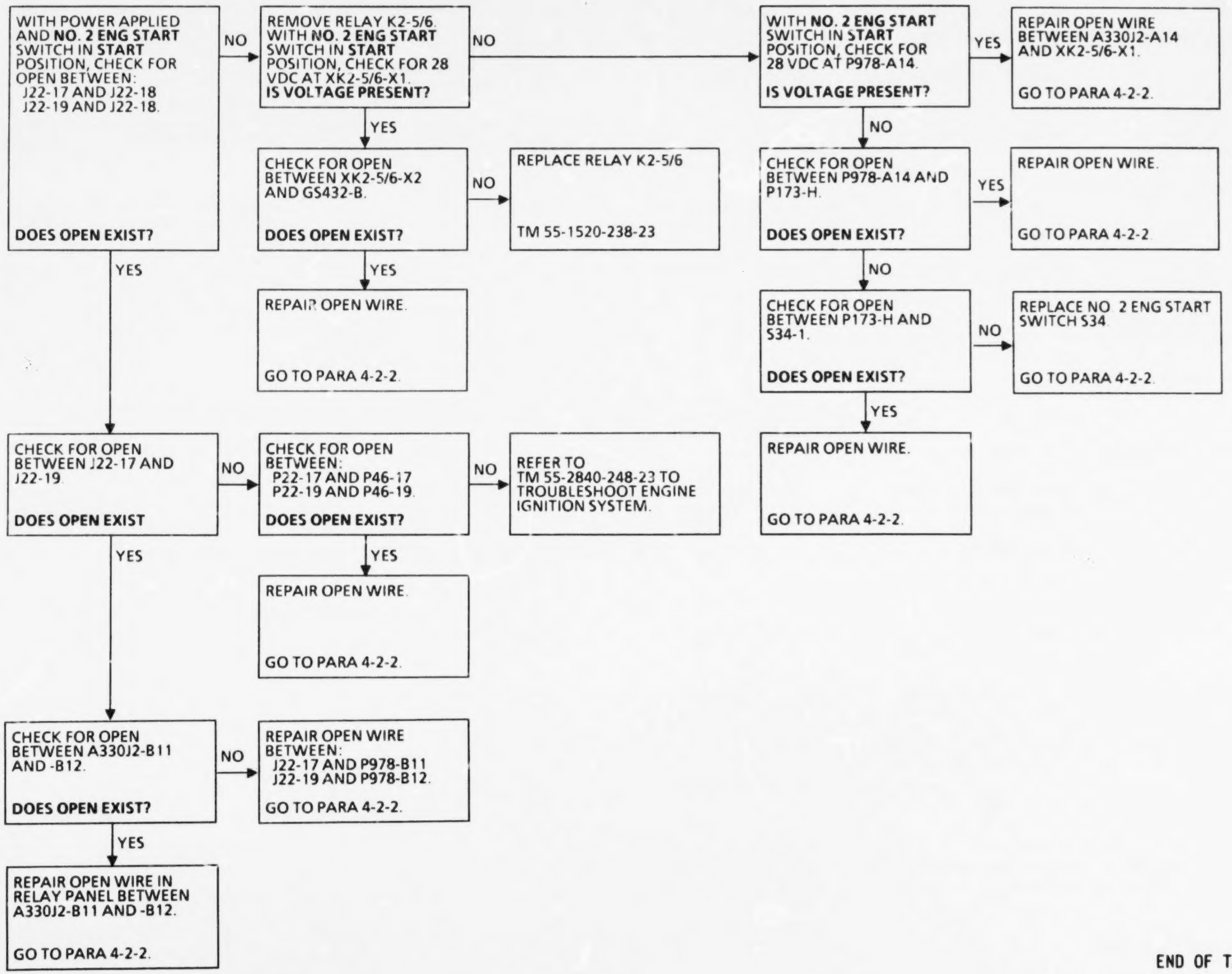
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 4-1-2	POWER PLANTS - POWER UP completed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

NOTE

Disconnect P21 and leave it disconnected while performing this troubleshooting procedure.


WITH POWER APPLIED AND NO. 2 ENG START SWITCH IN START POSITION, CHECK FOR OPEN BETWEEN: J22-17 AND J22-18 J22-19 AND J22-18. DOES OPEN EXIST?
NO
REMOVE RELAY K2-5/6. WITH NO. 2 ENG START SWITCH IN START POSITION, CHECK FOR 28 VDC AT XK2-5/6-X1. IS VOLTAGE PRESENT?
NO
WITH NO. 2 ENG START SWITCH IN START POSITION, CHECK FOR 28 VDC AT P978-A14. IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN A330J2-A14 AND XK2-5/6-X1. GO TO PARA 4-2-2.
YES
CHECK FOR OPEN BETWEEN XK2-5/6-X2 AND GS432-B. DOES OPEN EXIST?
NO
REPLACE RELAY K2-5/6 TM 55-1520-238-23
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
CHECK FOR OPEN BETWEEN P978-A14 AND P173-H. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
CHECK FOR OPEN BETWEEN P173-H AND S34-1. DOES OPEN EXIST?
NO
REPLACE NO. 2 ENG START SWITCH S34 GO TO PARA 4-2-2.
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
YES
CHECK FOR OPEN BETWEEN J22-17 AND J22-19 DOES OPEN EXIST
NO
CHECK FOR OPEN BETWEEN: P22-17 AND P46-17 P22-19 AND P46-19. DOES OPEN EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE IGNITION SYSTEM.
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
YES
CHECK FOR OPEN BETWEEN A330J2-B11 AND -B12. DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN: J22-17 AND P978-B11 J22-19 AND P978-B12. GO TO PARA 4-2-2.
YES
REPAIR OPEN WIRE IN RELAY PANEL BETWEEN A330J2-B11 AND -B12. GO TO PARA 4-2-2.

END OF TASK

4-2-37. OIL PSI ENG 1 INDICATOR - IS LIGHTED WITH ENGINE OIL PSIX10 INDICATING MORE THAN 22

TOOLS:

Nomenclature	Part Number 9NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

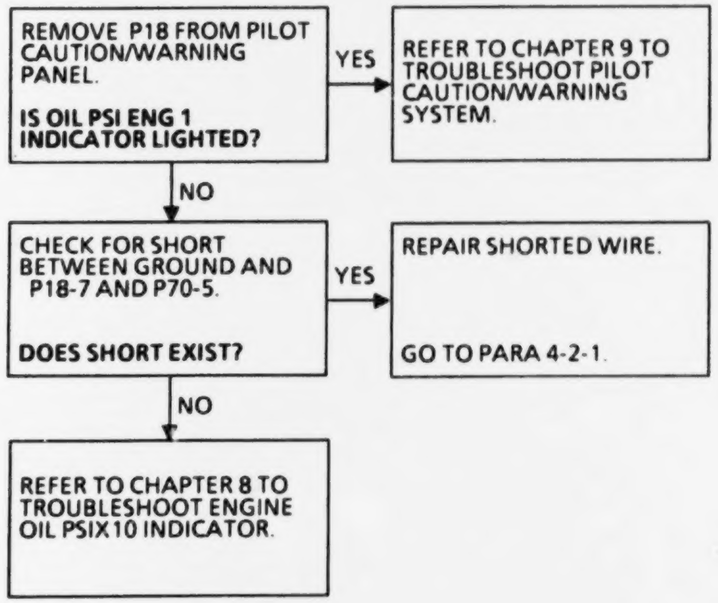
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS OIL PSI ENG 1 INDICATOR LIGHTED?

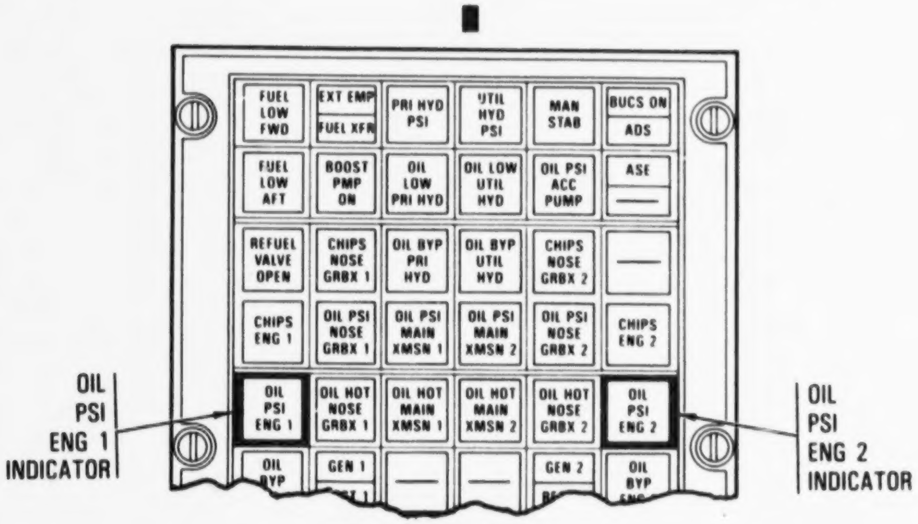
YES: REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CAUTION/WARNING SYSTEM.

NO: CHECK FOR SHORT BETWEEN GROUND AND P18-7 AND P70-5.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 4-2-1.

NO: REFER TO CHAPTER 8 TO TROUBLESHOOT ENGINE OIL PSIX10 INDICATOR.


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP
GEN 1
GEN 2
OIL BYP
OIL PSI ENG 1 INDICATOR
OIL PSI ENG 2 INDICATOR

PILOT CAUTION/WARNING PANEL

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END OF TASK

4-2-38. OIL PSI ENG 2 INDICATOR - IS LIGHTED WITH ENGINE OIL PSIX10 INDICATING MORE THAN 22

Tools: (para 4-2-37)

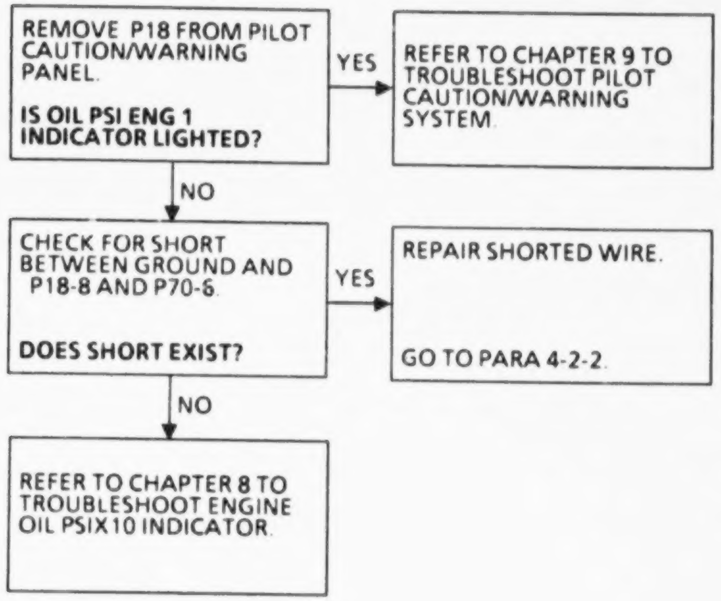
Personnel Required: (para 4-2-37)

References: (para 4-2-37)

Equipment Conditions: (para 4-2-37)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



REMOVE P18 FROM PILOT CAUTION/WARNING PANEL.

IS OIL PSI ENG 1 INDICATOR LIGHTED?

YES: REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CAUTION/WARNING SYSTEM.

NO: CHECK FOR SHORT BETWEEN GROUND AND P18-8 AND P70-6.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 4-2-2.

NO: REFER TO CHAPTER 8 TO TROUBLESHOOT ENGINE OIL PSIX10 INDICATOR.

END OF TASK

4-2-39. EMERG PWR INDICATOR - IS NOT LIGHTED WITH CKT B SWITCH SET TO ENG 1

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

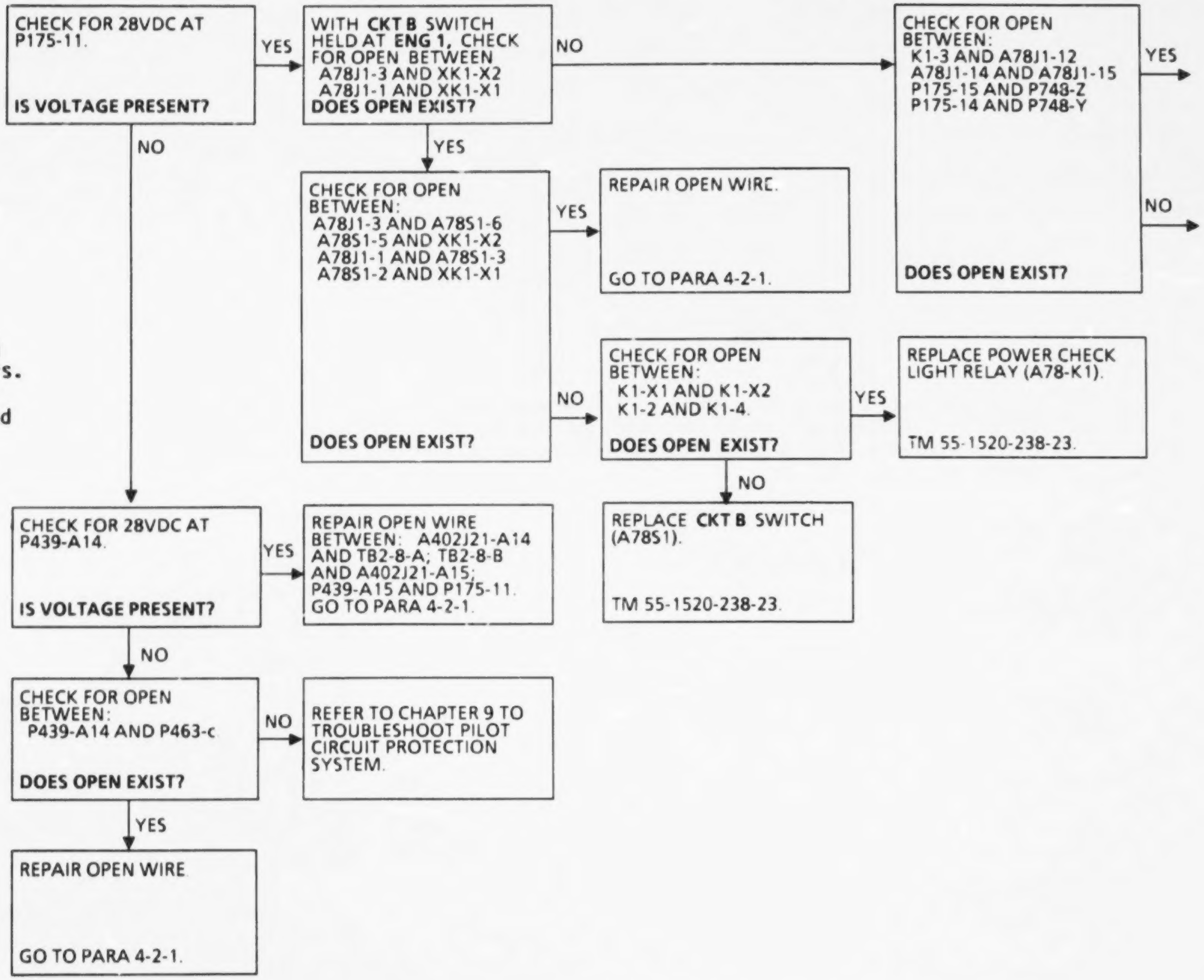
TM 55-1520-238-23
TM 55-2840-248-23

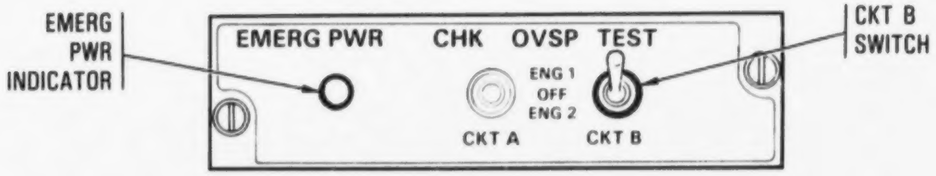
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR 28VDC AT P175-11.
IS VOLTAGE PRESENT?
YES
NO
WITH CKT B SWITCH HELD AT ENG 1, CHECK FOR OPEN BETWEEN A78J1-3 AND XK1-X2 A78J1-1 AND XK1-X1
DOES OPEN EXIST?
NO
YES
CHECK FOR OPEN BETWEEN: K1-3 AND A78J1-12 A78J1-14 AND A78J1-15 P175-15 AND P748-Z P175-14 AND P748-Y
DOES OPEN EXIST?
YES
NO
CHECK FOR OPEN BETWEEN: A78J1-3 AND A78S1-6 A78S1-5 AND XK1-X2 A78J1-1 AND A78S1-3 A78S1-2 AND XK1-X1
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN: K1-X1 AND K1-X2 K1-2 AND K1-4.
DOES OPEN EXIST?
YES
REPLACE POWER CHECK LIGHT RELAY (A78-K1). TM 55-1520-238-23.
NO
REPLACE CKT B SWITCH (A78S1). TM 55-1520-238-23.
CHECK FOR 28VDC AT P439-A14.
IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN: A402J21-A14 AND TB2-8-A; TB2-8-B AND A402J21-A15; P439-A15 AND P175-11. GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN: P439-A14 AND P463-c
DOES OPEN EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CIRCUIT PROTECTION SYSTEM.
YES
REPAIR OPEN WIRE GO TO PARA 4-2-1.


EMERG PWR INDICATOR
CKT B SWITCH
EMERG PWR
CHK OVSP TEST
ENG 1
OFF
ENG 2
CKT A
CKT B

ENGINE OVERSPEED TEST PANEL

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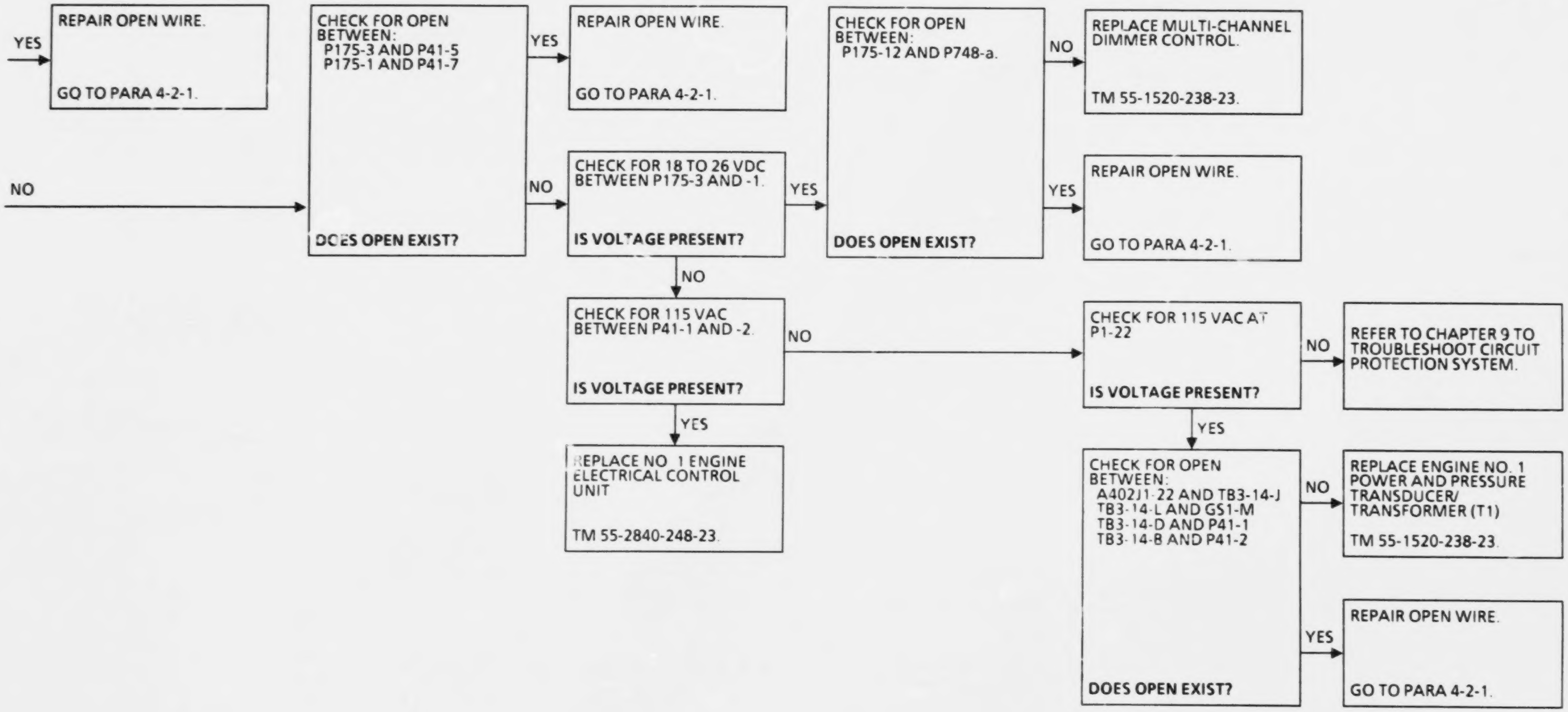
GO TO NEXT PAGE

4-2-39. EMERG PWR INDICATOR - IS NOT LIGHTED WITH CKT B SWITCH SET TO ENG 1 (cont)


YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN:
P175-3 AND P41-5
P175-1 AND P41-7
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
CHECK FOR 18 TO 26 VDC BETWEEN P175-3 AND -1.
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN:
P175-12 AND P748-a.
DOES OPEN EXIST?
NO
REPLACE MULTI-CHANNEL DIMMER CONTROL.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
CHECK FOR 115 VAC BETWEEN P41-1 AND -2.
IS VOLTAGE PRESENT?
NO
CHECK FOR 115 VAC AT P1-22
IS VOLTAGE PRESENT?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
YES
REPLACE NO. 1 ENGINE ELECTRICAL CONTROL UNIT
TM 55-2840-248-23.
YES
CHECK FOR OPEN BETWEEN:
A402J1-22 AND TB3-14-J
TB3-14-L AND GS1-M
TB3-14-D AND P41-1
TB3-14-B AND P41-2
DOES OPEN EXIST?
NO
REPLACE ENGINE NO. 1 POWER AND PRESSURE TRANSDUCER/ TRANSFORMER (T1)
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.

END OF TASK

4-2-40. EMERG PWR INDICATOR - IS NOT LIGHTED WITH CKT B SWITCH SET TO ENG 2

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

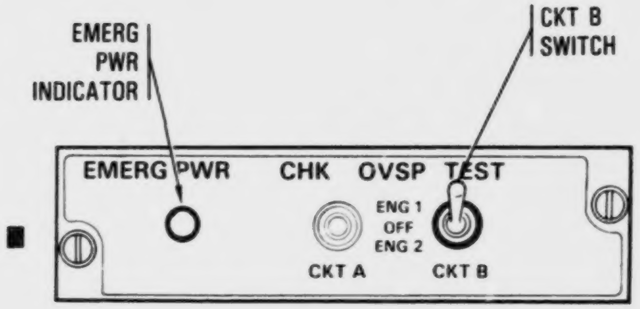
67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

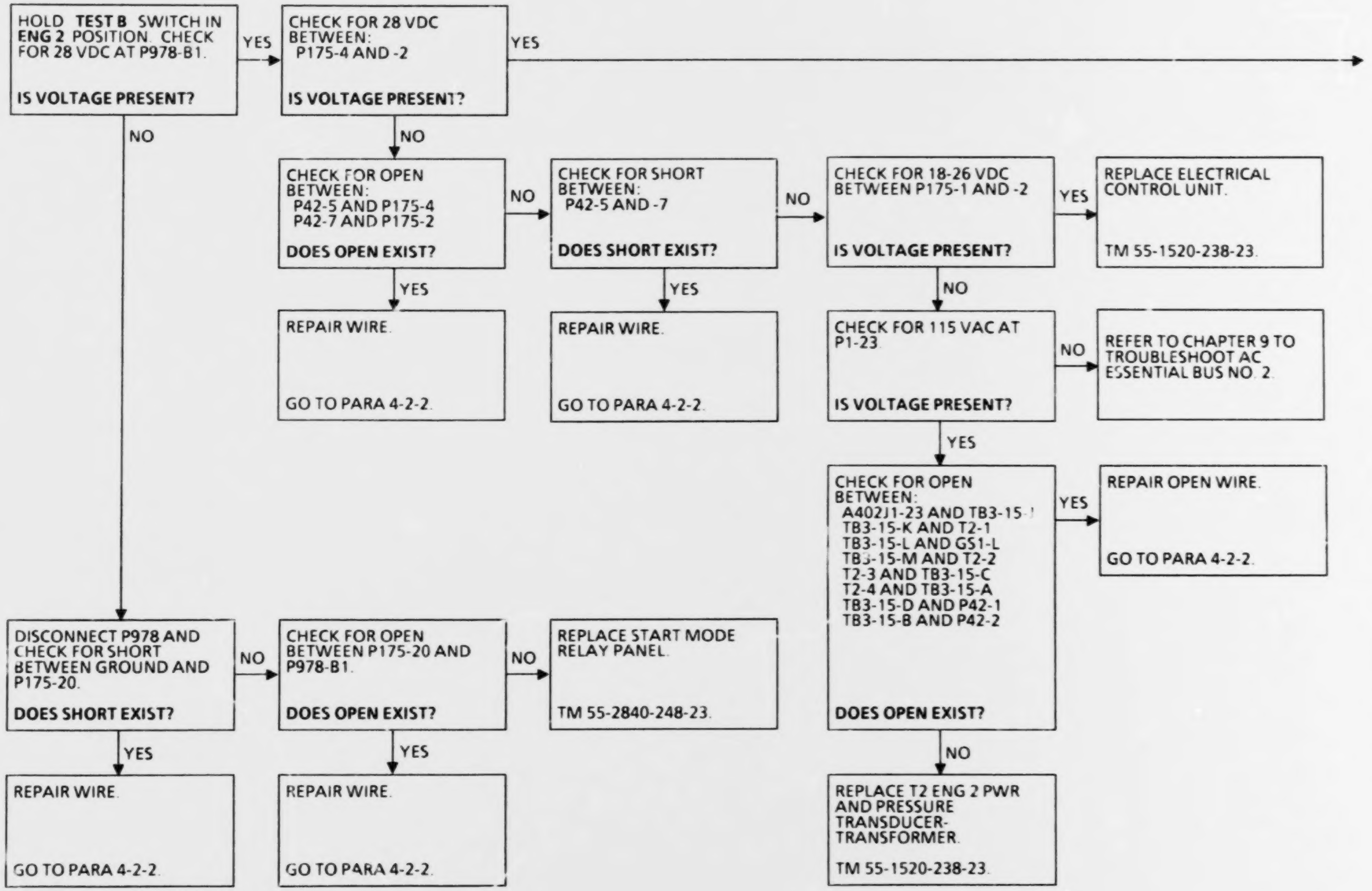
TM 55-1520-238-23
TM 55-2840-248-23
TM 11-1520-238-23-2

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed


EMERG PWR INDICATOR
CKT B SWITCH
EMERG PWR
CHK
OVSP
TEST
ENG 1
OFF
ENG 2
CKT A
CKT B

ENGINE OVERSPEED TEST PANEL


HOLD TEST B SWITCH IN ENG 2 POSITION. CHECK FOR 28 VDC AT P978-B1.
IS VOLTAGE PRESENT?
YES
CHECK FOR 28 VDC BETWEEN: P175-4 AND -2
IS VOLTAGE PRESENT?
YES
NO
NO
CHECK FOR OPEN BETWEEN: P42-5 AND P175-4 P42-7 AND P175-2
DOES OPEN EXIST?
NO
CHECK FOR SHORT BETWEEN: P42-5 AND -7
DOES SHORT EXIST?
NO
CHECK FOR 18-26 VDC BETWEEN P175-1 AND -2
IS VOLTAGE PRESENT?
YES
REPLACE ELECTRICAL CONTROL UNIT.
TM 55-1520-238-23.
YES
REPAIR WIRE.
GO TO PARA 4-2-2.
YES
REPAIR WIRE.
GO TO PARA 4-2-2.
NO
CHECK FOR 115 VAC AT P1-23.
IS VOLTAGE PRESENT?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT AC ESSENTIAL BUS NO. 2.
YES
CHECK FOR OPEN BETWEEN: A402J1-23 AND TB3-15-J TB3-15-K AND T2-1 TB3-15-L AND GS1-L TB3-15-M AND T2-2 T2-3 AND TB3-15-C T2-4 AND TB3-15-A TB3-15-D AND P42-1 TB3-15-B AND P42-2
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-2.
NO
REPLACE T2 ENG 2 PWR AND PRESSURE TRANSDUCER-TRANSFORMER.
TM 55-1520-238-23.
DISCONNECT P978 AND CHECK FOR SHORT BETWEEN GROUND AND P175-20.
DOES SHORT EXIST?
NO
CHECK FOR OPEN BETWEEN P175-20 AND P978-B1.
DOES OPEN EXIST?
NO
REPLACE START MODE RELAY PANEL.
TM 55-2840-248-23.
YES
REPAIR WIRE.
GO TO PARA 4-2-2.
YES
REPAIR WIRE.
GO TO PARA 4-2-2.

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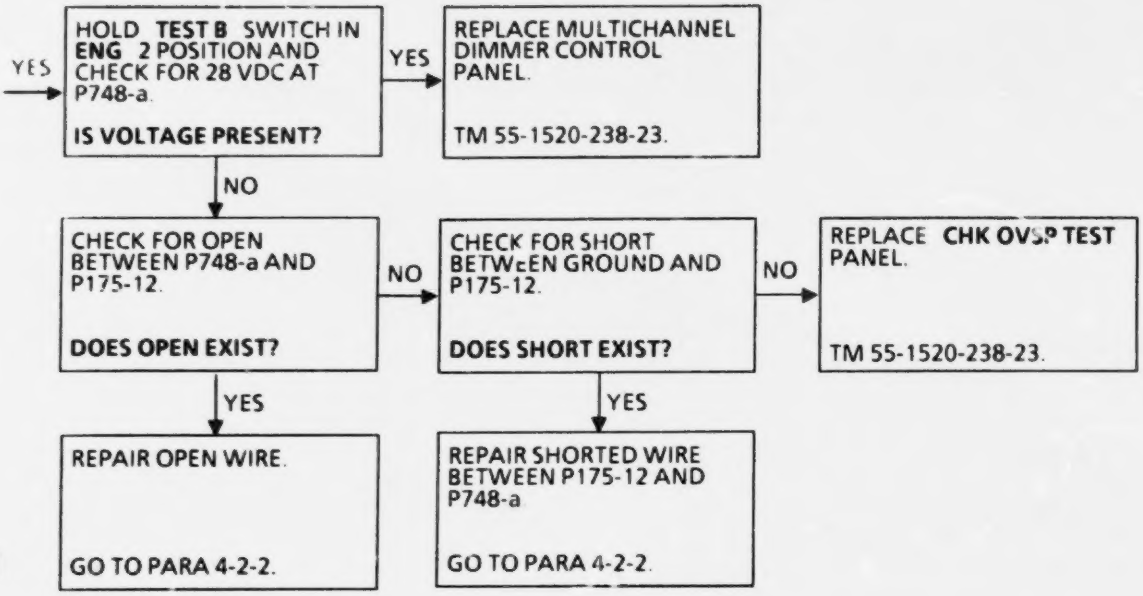
4-2-40. EMERG PWR INDICATOR - IS NOT LIGHTED WITH CKT B SWITCH SET TO ENG 2 (cont)



HOLD **TEST B** SWITCH IN **ENG** 2 POSITION AND CHECK FOR 28 VDC AT P748-a.

IS VOLTAGE PRESENT?

REPLACE MULTICHANNEL DIMMER CONTROL PANEL.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN P748-a AND P175-12.

DOES OPEN EXIST?

CHECK FOR SHORT BETWEEN GROUND AND P175-12.

DOES SHORT EXIST?

REPLACE **CHK OVSP TEST** PANEL.

TM 55-1520-238-23.

REPAIR OPEN WIRE.

GO TO PARA 4-2-2.

REPAIR SHORTED WIRE BETWEEN P175-12 AND P748-a

GO TO PARA 4-2-2.

4-2-41. ECS AIRFLOW PRESENT WITH NO. 1 ENG START SWITCH AT IGN OVRD

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

TM 55-1520-238-23

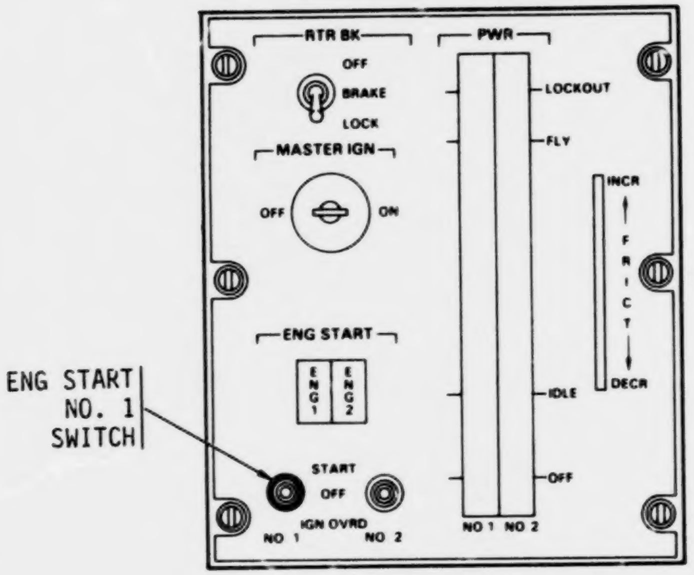
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter Safed
	Access provisions - panel L200 removed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

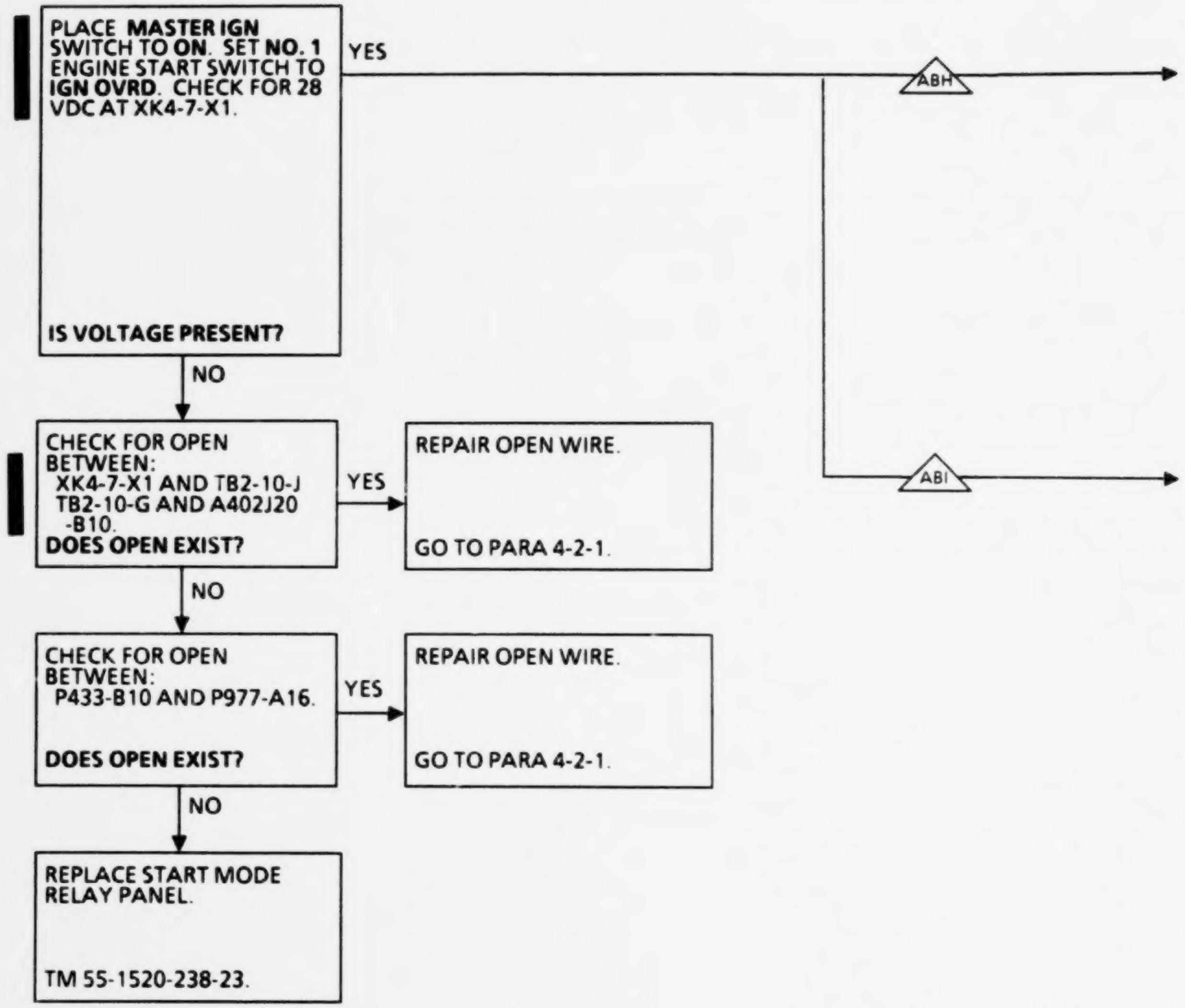
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

PILOT POWER QUADRANT

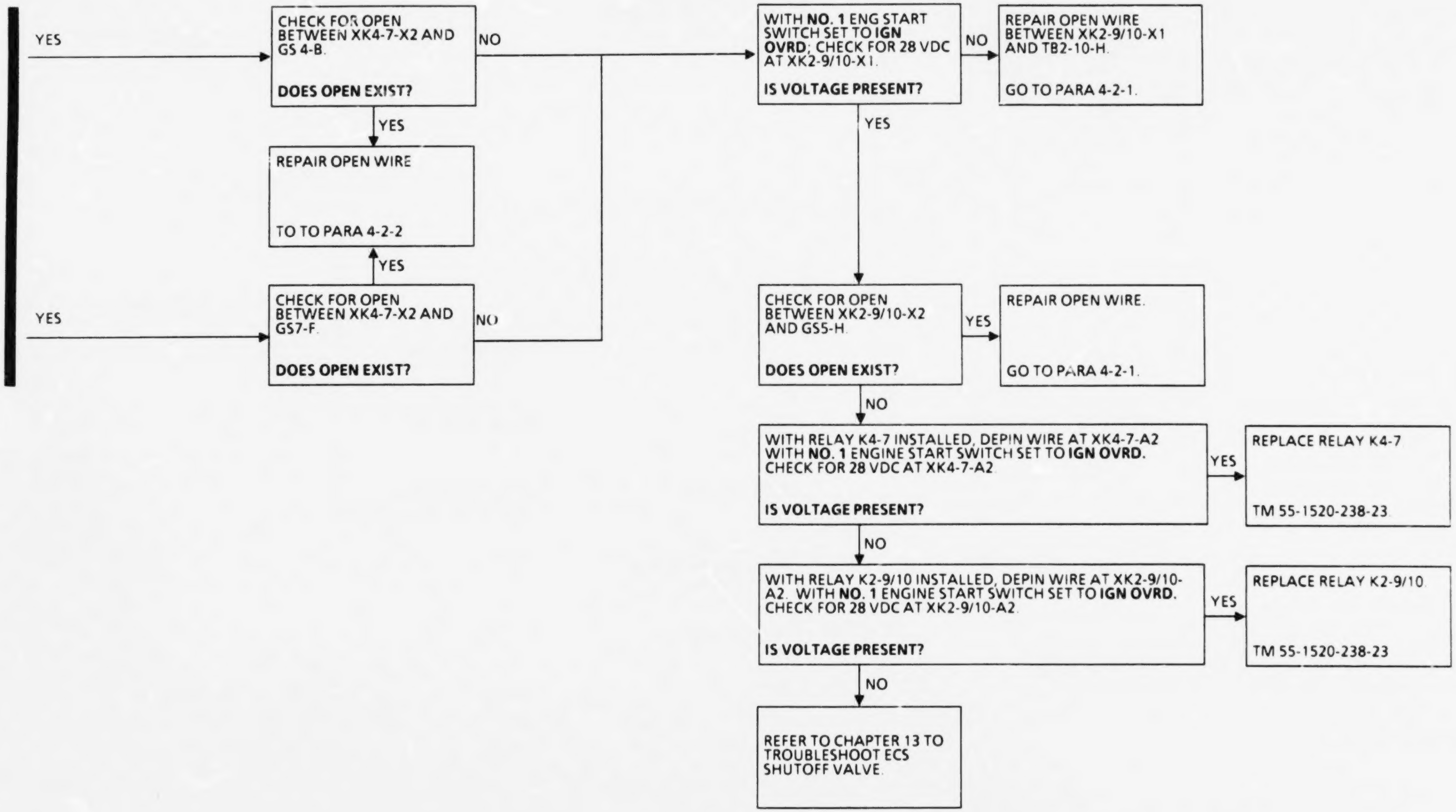

ENG START NO. 1 SWITCH
RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
PWR
LOCKOUT
FLY
IDLE
OFF
NO 1
NO 2
INCR
FRICT
DECR

MM04/1-3398


PLACE MASTER IGN SWITCH TO ON. SET NO. 1 ENGINE START SWITCH TO IGN OVRD. CHECK FOR 28 VDC AT XK4-7-X1.
IS VOLTAGE PRESENT?
YES
ABH
ABI
NO
CHECK FOR OPEN BETWEEN: XK4-7-X1 AND TB2-10-J TB2-10-G AND A402J20 -B10.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN: P433-B10 AND P977-A16.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
REPLACE START MODE RELAY PANEL.
TM 55-1520-238-23.

GO TO NEXT PAGE

4-2-41. ECS AIRFLOW PRESENT WITH NO. 1 ENG START SWITCH AT IGN OVRD (cont)


YES
CHECK FOR OPEN BETWEEN XK4-7-X2 AND GS 4-B.
DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE
TO TO PARA 4-2-2
YES
YES
CHECK FOR OPEN BETWEEN XK4-7-X2 AND GS7-F.
DOES OPEN EXIST?
NO
WITH NO. 1 ENG START SWITCH SET TO IGN OVRD; CHECK FOR 28 VDC AT XK2-9/10-X1.
IS VOLTAGE PRESENT?
NO
REPAIR OPEN WIRE BETWEEN XK2-9/10-X1 AND TB2-10-H.
GO TO PARA 4-2-1.
YES
CHECK FOR OPEN BETWEEN XK2-9/10-X2 AND GS5-H.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
WITH RELAY K4-7 INSTALLED, DEPIN WIRE AT XK4-7-A2 WITH NO. 1 ENGINE START SWITCH SET TO IGN OVRD. CHECK FOR 28 VDC AT XK4-7-A2.
IS VOLTAGE PRESENT?
YES
REPLACE RELAY K4-7
TM 55-1520-238-23
NO
WITH RELAY K2-9/10 INSTALLED, DEPIN WIRE AT XK2-9/10-A2. WITH NO. 1 ENGINE START SWITCH SET TO IGN OVRD. CHECK FOR 28 VDC AT XK2-9/10-A2.
IS VOLTAGE PRESENT?
YES
REPLACE RELAY K2-9/10.
TM 55-1520-238-23
NO
REFER TO CHAPTER 13 TO TROUBLESHOOT ECS SHUTOFF VALVE.

END OF TASK

4-2-42. ECS AIRFLOW PRESENT WITH NO. 2 ENG START SWITCH AT IGN OVRD

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

TM 55-1520-238-23

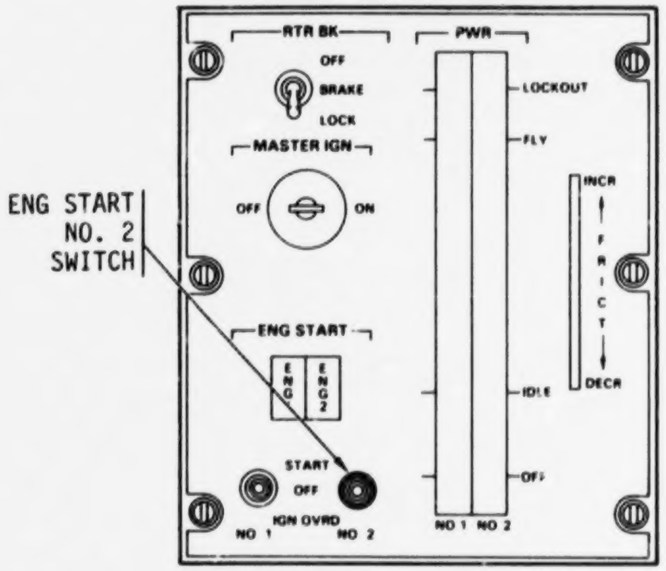
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter Safed
	Access provisions - panel L200 removed
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

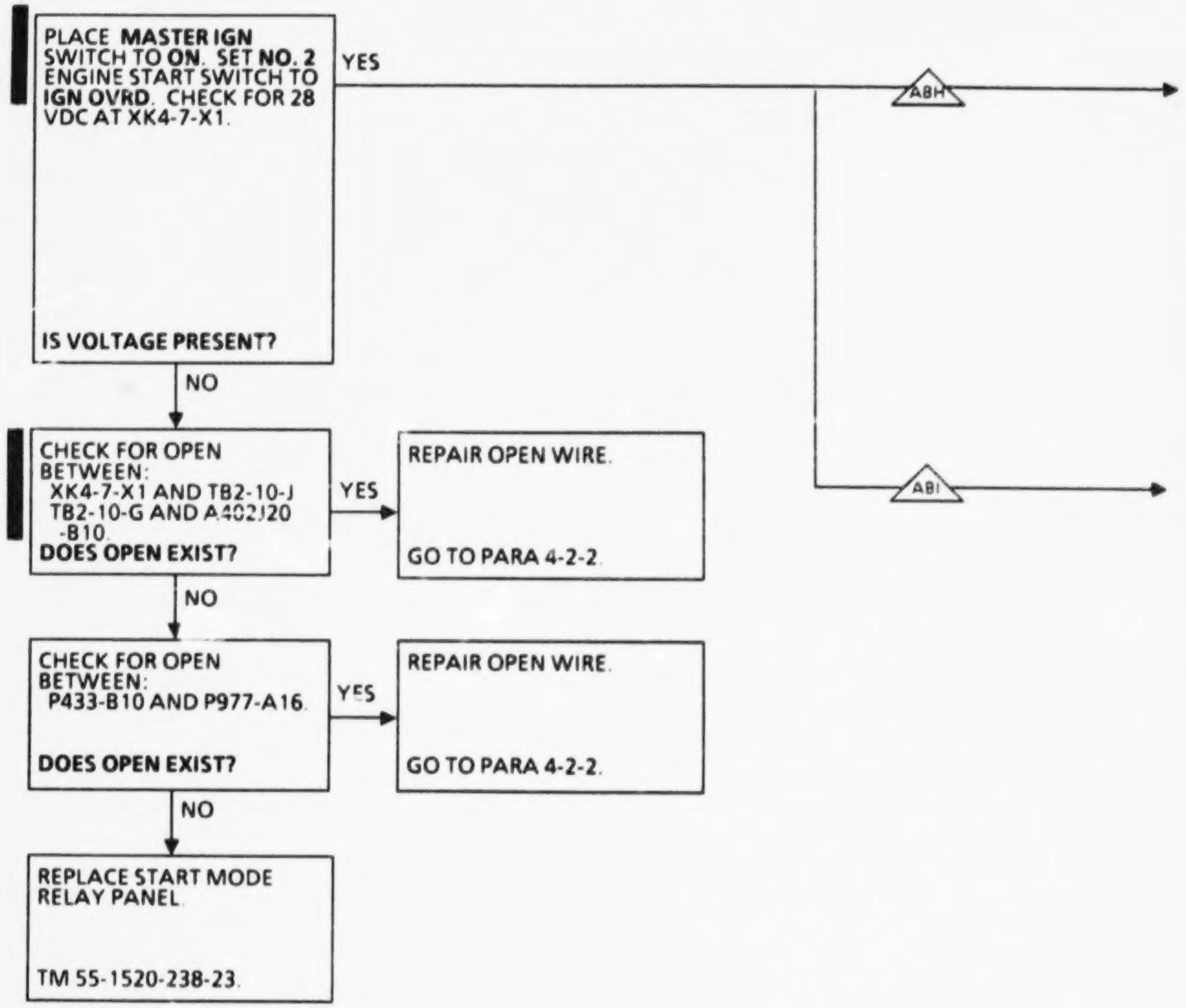
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

PILOT POWER QUADRANT


ENG START
NO. 2
SWITCH
RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
PWR
LOCKOUT
FLY
IDLE
OFF
NO 1
NO 2
INCR
FRICT
DECR

MM04/1-3399


YES
NO
YES
NO
YES
NO
ABH
ABI

PLACE **MASTER IGN** SWITCH TO **ON**. SET **NO. 2** ENGINE START SWITCH TO **IGN OVRD**. CHECK FOR 28 VDC AT XK4-7-X1.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN:
XK4-7-X1 AND TB2-10-J
TB2-10-G AND A402J20-B10.
DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 4-2-2.

CHECK FOR OPEN BETWEEN:
P433-B10 AND P977-A16.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

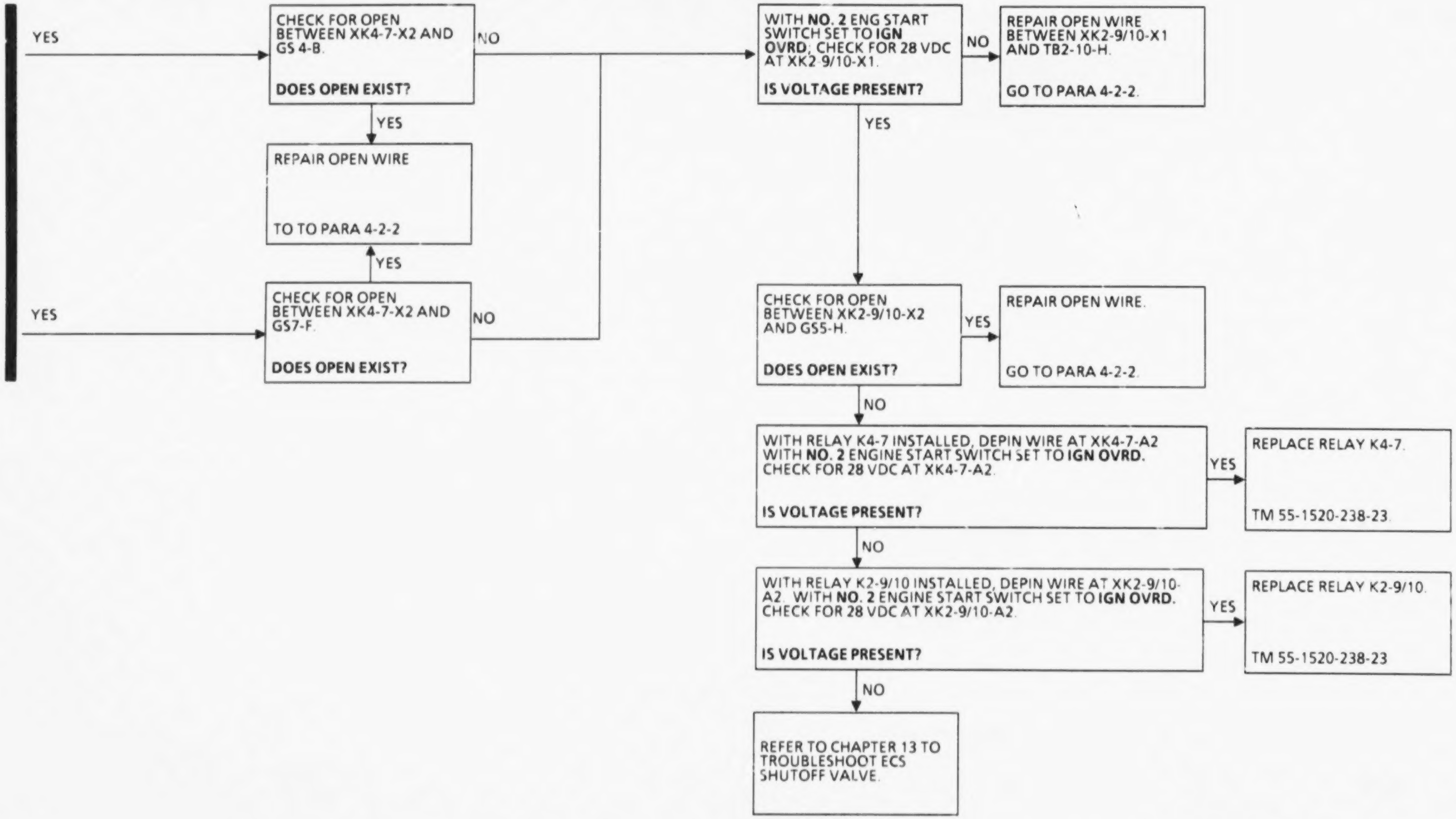
GO TO PARA 4-2-2.

REPLACE START MODE RELAY PANEL.

TM 55-1520-238-23.

GO TO NEXT PAGE

4-2-42. ECS AIRFLOW PRESENT WITH NO. 2 ENG START SWITCH AT IGN OVRD (cont)


YES
CHECK FOR OPEN BETWEEN XK4-7-X2 AND GS 4-B.
DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE
TO TO PARA 4-2-2
YES
YES
CHECK FOR OPEN BETWEEN XK4-7-X2 AND GS7-F.
DOES OPEN EXIST?
NO
WITH NO. 2 ENG START SWITCH SET TO IGN OVRD, CHECK FOR 28 VDC AT XK2 9/10-X1.
IS VOLTAGE PRESENT?
NO
REPAIR OPEN WIRE BETWEEN XK2-9/10-X1 AND TB2-10-H.
GO TO PARA 4-2-2.
YES
CHECK FOR OPEN BETWEEN XK2-9/10-X2 AND GS5-H.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-2.
NO
WITH RELAY K4-7 INSTALLED, DEPIN WIRE AT XK4-7-A2 WITH NO. 2 ENGINE START SWITCH SET TO IGN OVRD. CHECK FOR 28 VDC AT XK4-7-A2.
IS VOLTAGE PRESENT?
YES
REPLACE RELAY K4-7.
TM 55-1520-238-23.
NO
WITH RELAY K2-9/10 INSTALLED, DEPIN WIRE AT XK2-9/10-A2. WITH NO. 2 ENGINE START SWITCH SET TO IGN OVRD. CHECK FOR 28 VDC AT XK2-9/10-A2.
IS VOLTAGE PRESENT?
YES
REPLACE RELAY K2-9/10.
TM 55-1520-238-23
NO
REFER TO CHAPTER 13 TO TROUBLESHOOT ECS SHUTOFF VALVE.

END OF TASK

4-2-43. EXCESSIVE TORSIONAL VIBRATION AND N_R DROOP OCCURS DURING FLIGHT - (NO. 1 ENGINE N_P LAGS BEHIND NO. 2 N_P DURING RECOVERY MANEUVER)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

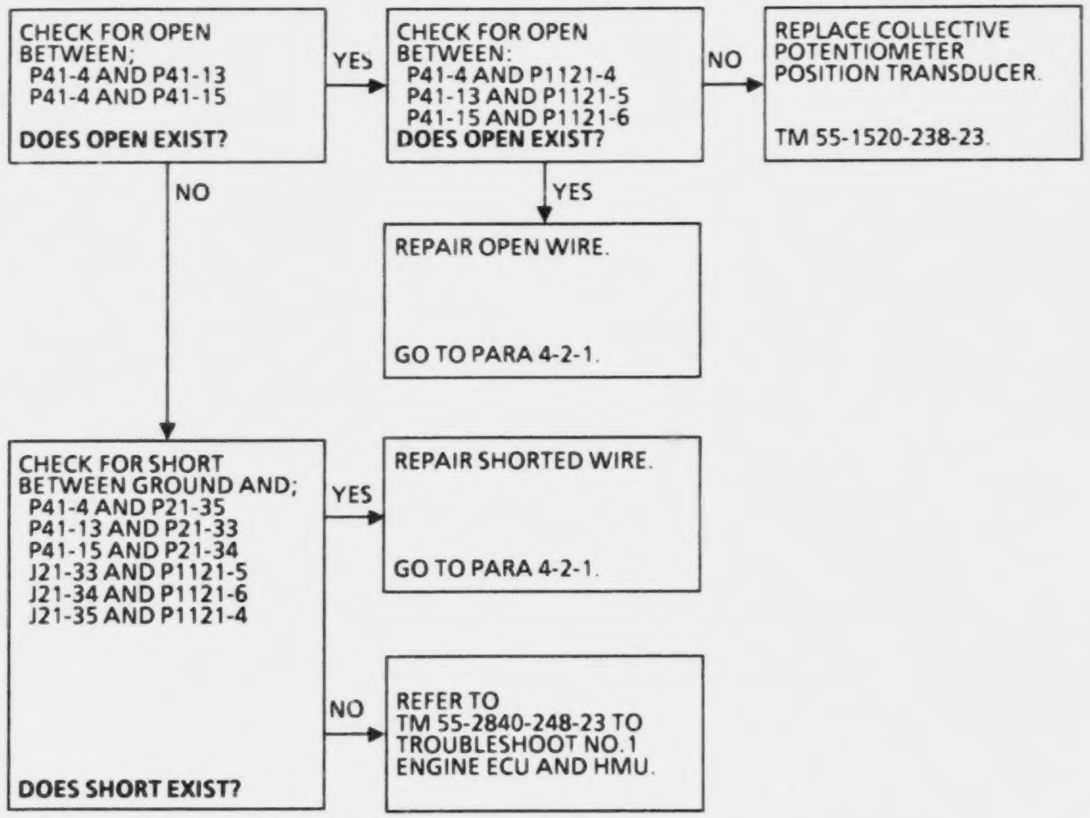
TM 55-1520-238-23
TM 55-2840-248-23
TM 55-1520-238-MTF

Equipment Conditions:

Ref	Condition
TM 55-1520-238-MTF	Suspect Engine Identified
TM 55-1520-238-23	Helicopter Safed
	N_R Droop Compensator Potentiometer Adjustment - completed
	Access provisions - LN1, LN3, LN4 - doors opened
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR OPEN BETWEEN;
P41-4 AND P41-13
P41-4 AND P41-15
DOES OPEN EXIST?
YES
CHECK FOR OPEN BETWEEN:
P41-4 AND P1121-4
P41-13 AND P1121-5
P41-15 AND P1121-6
DOES OPEN EXIST?
NO
REPLACE COLLECTIVE POTENTIOMETER POSITION TRANSDUCER.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-1.
NO
CHECK FOR SHORT BETWEEN GROUND AND;
P41-4 AND P21-35
P41-13 AND P21-33
P41-15 AND P21-34
J21-33 AND P1121-5
J21-34 AND P1121-6
J21-35 AND P1121-4
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
GO TO PARA 4-2-1.
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT NO.1 ENGINE ECU AND HMU.

END OF TASK

4-2-44. EXCESSIVE TORSIONAL VIBRATION AND N_R DROOP OCCURS DURING FLIGHT - (NO. 2 ENGINE N_P LAGS BEHIND NO. 1 N_P DURING RECOVERY MANEUVER)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

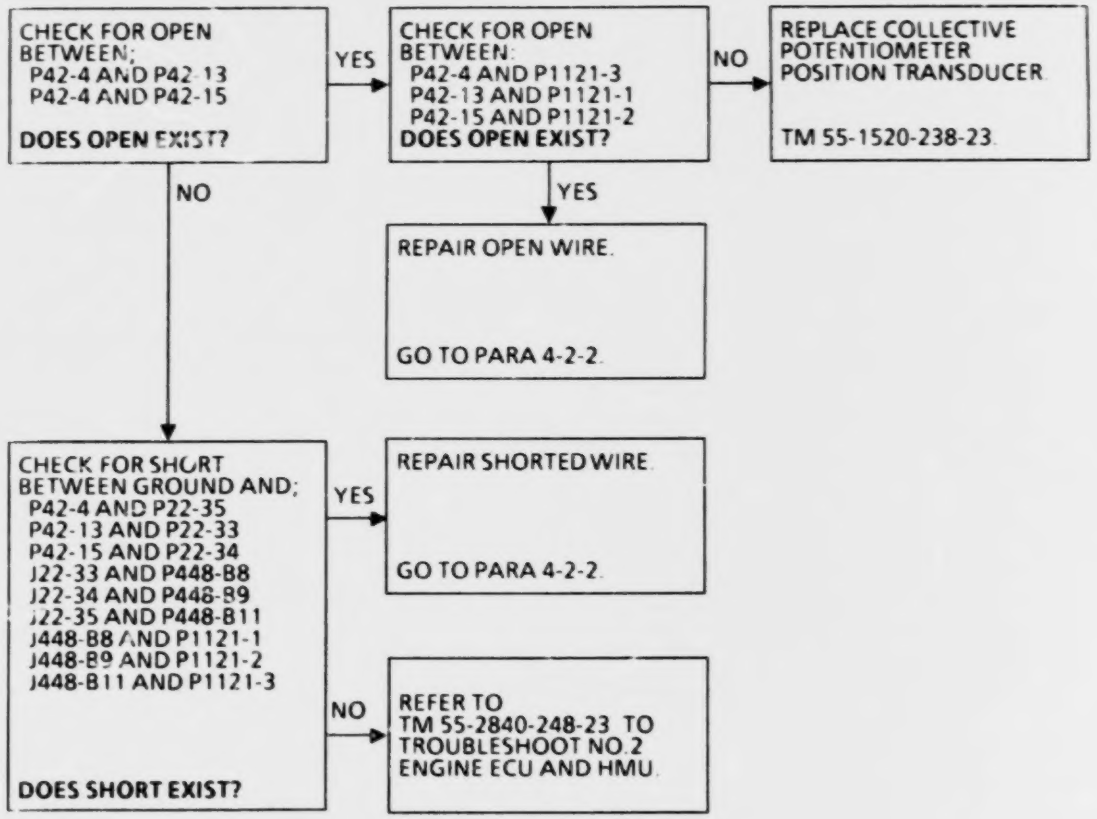
TM 55-1520-238-23
TM 55-2840-248-23
TM 55-1520-238-MTF

Equipment Conditions:

Ref	Condition
TM 55-1520-238-MTF	Suspect Engine Identified
TM 55-1520-238-23	Helicopter Safed
	N_R Droop Compensator Potentiometer Adjustment - completed
	Access provisions - RN1, RN3, RN4 - doors opened
Para 1-3-2	ICS connected
Para 4-1-2	POWER PLANTS - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR OPEN BETWEEN;
P42-4 AND P42-13
P42-4 AND P42-15
DOES OPEN EXIST?
YES
CHECK FOR OPEN BETWEEN:
P42-4 AND P1121-3
P42-13 AND P1121-1
P42-15 AND P1121-2
DOES OPEN EXIST?
NO
REPLACE COLLECTIVE POTENTIOMETER POSITION TRANSDUCER
TM 55-1520-238-23
YES
REPAIR OPEN WIRE.
GO TO PARA 4-2-2.
NO
CHECK FOR SHORT BETWEEN GROUND AND;
P42-4 AND P22-35
P42-13 AND P22-33
P42-15 AND P22-34
J22-33 AND P448-B8
J22-34 AND P448-B9
J22-35 AND P448-B11
J448-B8 AND P1121-1
J448-B9 AND P1121-2
J448-B11 AND P1121-3
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
GO TO PARA 4-2-2.
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT NO.2 ENGINE ECU AND HMU.

END OF TASK

4-2-45. ENGINE 1 DOES NOT RELIGHT - CKT A AND CKT B SWITCHES RELEASED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

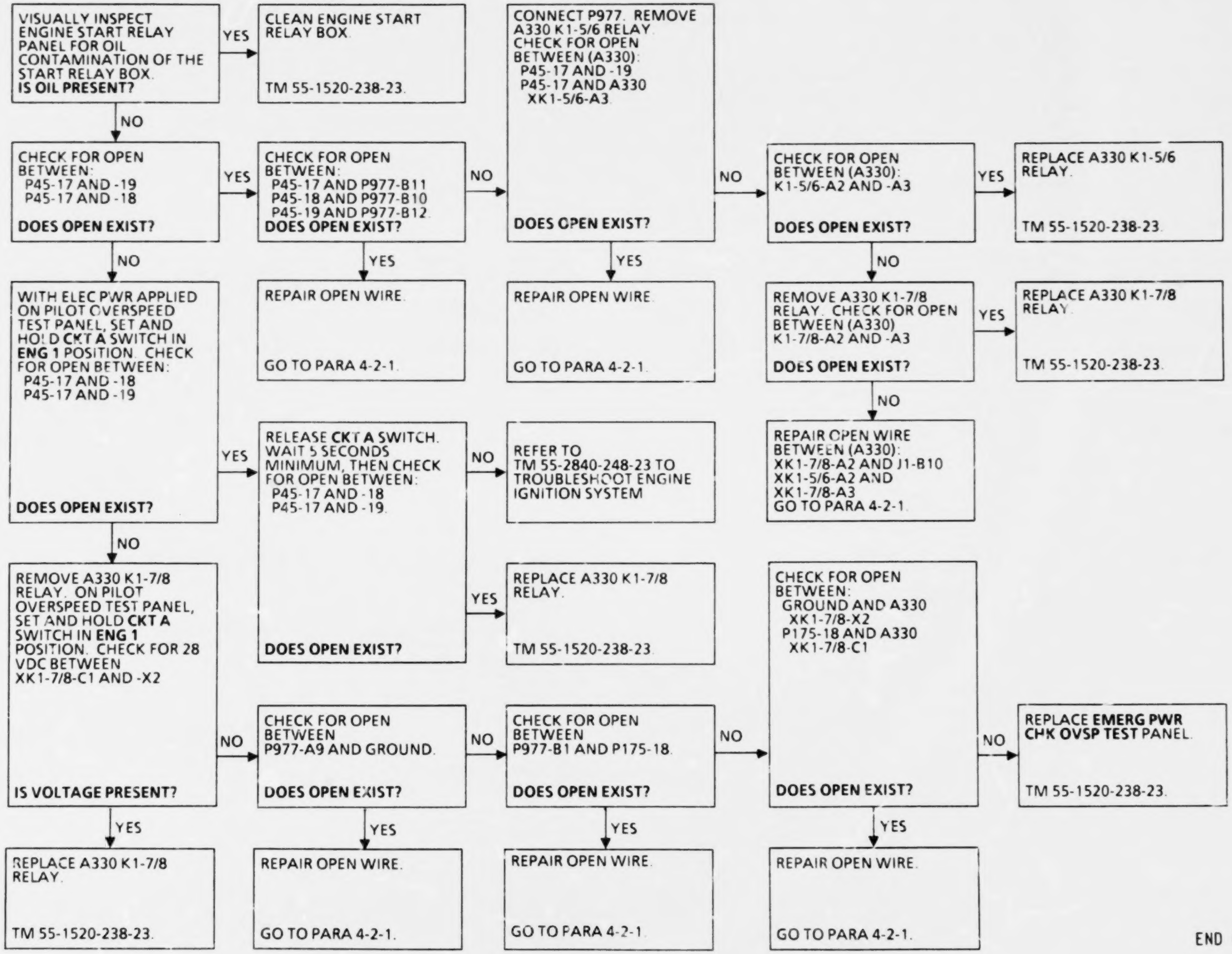
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 panel removed
Para 4-1-2	POWER PLANTS - POWER UP completed


VISUALLY INSPECT ENGINE START RELAY PANEL FOR OIL CONTAMINATION OF THE START RELAY BOX. IS OIL PRESENT?
YES
CLEAN ENGINE START RELAY BOX. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P45-17 AND -19 P45-17 AND -18 DOES OPEN EXIST?
YES
CHECK FOR OPEN BETWEEN: P45-17 AND P977-B11 P45-18 AND P977-B10 P45-19 AND P977-B12. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
CONNECT P977. REMOVE A330 K1-5/6 RELAY. CHECK FOR OPEN BETWEEN (A330): P45-17 AND -19 P45-17 AND A330 XK1-5/6-A3. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN (A330): K1-5/6-A2 AND -A3 DOES OPEN EXIST?
YES
REPLACE A330 K1-5/6 RELAY. TM 55-1520-238-23.
NO
REMOVE A330 K1-7/8 RELAY. CHECK FOR OPEN BETWEEN (A330) K1-7/8-A2 AND -A3 DOES OPEN EXIST?
YES
REPLACE A330 K1-7/8 RELAY. TM 55-1520-238-23.
NO
REPAIR OPEN WIRE BETWEEN (A330): XK1-7/8-A2 AND J1-B10 XK1-5/6-A2 AND XK1-7/8-A3 GO TO PARA 4-2-1.
NO
WITH ELEC PWR APPLIED ON PILOT OVERSPEED TEST PANEL, SET AND HOLD CKT A SWITCH IN ENG 1 POSITION. CHECK FOR OPEN BETWEEN: P45-17 AND -18 P45-17 AND -19 DOES OPEN EXIST?
YES
RELEASE CKT A SWITCH. WAIT 5 SECONDS MINIMUM, THEN CHECK FOR OPEN BETWEEN: P45-17 AND -18 P45-17 AND -19. DOES OPEN EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE IGNITION SYSTEM
YES
REPLACE A330 K1-7/8 RELAY. TM 55-1520-238-23.
NO
REMOVE A330 K1-7/8 RELAY. ON PILOT OVERSPEED TEST PANEL, SET AND HOLD CKT A SWITCH IN ENG 1 POSITION. CHECK FOR 28 VDC BETWEEN XK1-7/8-C1 AND -X2 IS VOLTAGE PRESENT?
YES
REPLACE A330 K1-7/8 RELAY. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN P977-A9 AND GROUND. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN P977-B1 AND P175-18. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
CHECK FOR OPEN BETWEEN: GROUND AND A330 XK1-7/8-X2 P175-18 AND A330 XK1-7/8-C1 DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-1.
NO
REPLACE EMERG PWR CHK OVSP TEST PANEL. TM 55-1520-238-23.

END OF TASK

4-2-46. ENGINE 2 DOES NOT RELIGHT - CKT A AND CKT B SWITCHES RELEASED

Tools: (para 4-2-45)

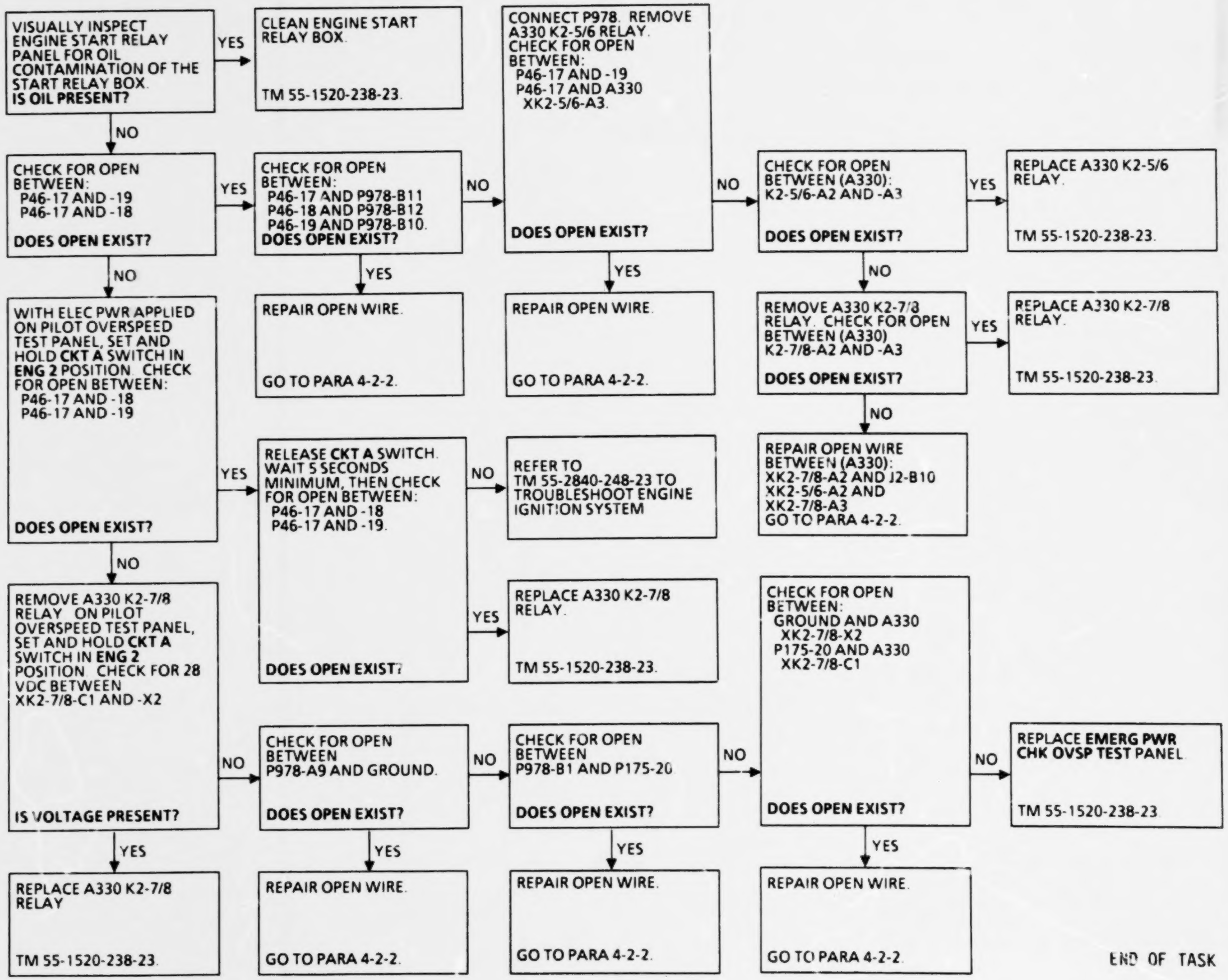
Personnel Required: (para 4-2-45)

References: (para 4-2-45)

Equipment Conditions: (para 4-2-45)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


VISUALLY INSPECT ENGINE START RELAY PANEL FOR OIL CONTAMINATION OF THE START RELAY BOX. IS OIL PRESENT?
YES
CLEAN ENGINE START RELAY BOX. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P46-17 AND -19 P46-17 AND -18 DOES OPEN EXIST?
YES
CHECK FOR OPEN BETWEEN: P46-17 AND P978-B11 P46-18 AND P978-B12 P46-19 AND P978-B10. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
CONNECT P978. REMOVE A330 K2-5/6 RELAY. CHECK FOR OPEN BETWEEN: P46-17 AND -19 P46-17 AND A330 XK2-5/6-A3. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
CHECK FOR OPEN BETWEEN (A330): K2-5/6-A2 AND -A3 DOES OPEN EXIST?
YES
REPLACE A330 K2-5/6 RELAY. TM 55-1520-238-23.
NO
REMOVE A330 K2-7/8 RELAY. CHECK FOR OPEN BETWEEN (A330) K2-7/8-A2 AND -A3 DOES OPEN EXIST?
YES
REPLACE A330 K2-7/8 RELAY. TM 55-1520-238-23.
NO
REPAIR OPEN WIRE BETWEEN (A330): XK2-7/8-A2 AND J2-B10 XK2-5/6-A2 AND XK2-7/8-A3 GO TO PARA 4-2-2.
NO
WITH ELEC PWR APPLIED ON PILOT OVERSPEED TEST PANEL, SET AND HOLD CKT A SWITCH IN ENG 2 POSITION. CHECK FOR OPEN BETWEEN: P46-17 AND -18 P46-17 AND -19 DOES OPEN EXIST?
YES
RELEASE CKT A SWITCH. WAIT 5 SECONDS MINIMUM, THEN CHECK FOR OPEN BETWEEN: P46-17 AND -18 P46-17 AND -19. DOES OPEN EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE IGNITION SYSTEM
YES
REPLACE A330 K2-7/8 RELAY. TM 55-1520-238-23.
NO
REMOVE A330 K2-7/8 RELAY. ON PILOT OVERSPEED TEST PANEL, SET AND HOLD CKT A SWITCH IN ENG 2 POSITION. CHECK FOR 28 VDC BETWEEN XK2-7/8-C1 AND -X2 IS VOLTAGE PRESENT?
YES
REPLACE A330 K2-7/8 RELAY TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN P978-A9 AND GROUND. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
CHECK FOR OPEN BETWEEN P978-B1 AND P175-20 DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
CHECK FOR OPEN BETWEEN: GROUND AND A330 XK2-7/8-X2 P175-20 AND A330 XK2-7/8-C1 DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 4-2-2.
NO
REPLACE EMERG PWR CHK OVSP TEST PANEL TM 55-1520-238-23.

END OF TASK

4-2-47. PILOT POWER QUADRANT PANEL EDGE-LIGHT - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Pilot Fuel panel - removed

REFER TO VOLTAGE WARNING

ON PILOT CIRCUIT BREAKER PANEL, CLOSE **LT PRI** CIRCUIT BREAKER. ON PILOT **EXT LT / INTR LT** PANEL, SET **L CSL** TO **BRT**. CHECK FOR 5 VDC BETWEEN P173-X AND GROUND.

IS VOLTAGE PRESENT?

YES → REPLACE PILOT POWER QUADRANT PANEL.

TM 55-1520-238-23.

NO → CHECK FOR OPEN BETWEEN TB1-28-8 AND P173-X.

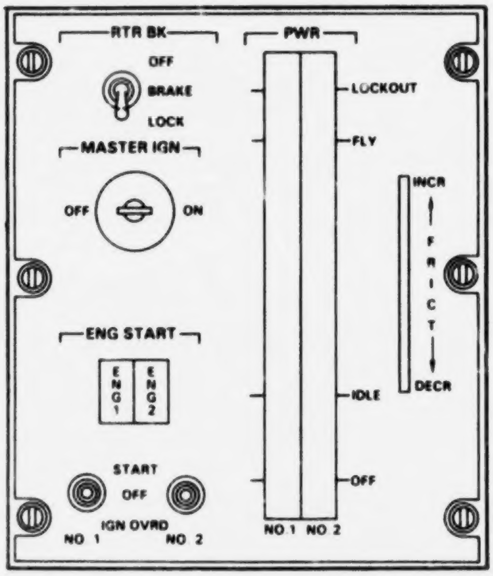
DOES OPEN EXIST?

YES → REPAIR OPEN WIRE.

GO TO PARA 4-2-1.

NO → REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE-LIGHT.

PILOT POWER QUADRANT


RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
PWR
LOCKOUT
FLY
IDLE
OFF
NO 1
NO 2
INCR
FRICT
DECR

MM04/1-1491

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

END OF TASK

4-2-48. CPG POWER QUADRANT PANEL EDGE-LIGHT - DOES NOT LIGHT

Tools: (para 4-2-47)

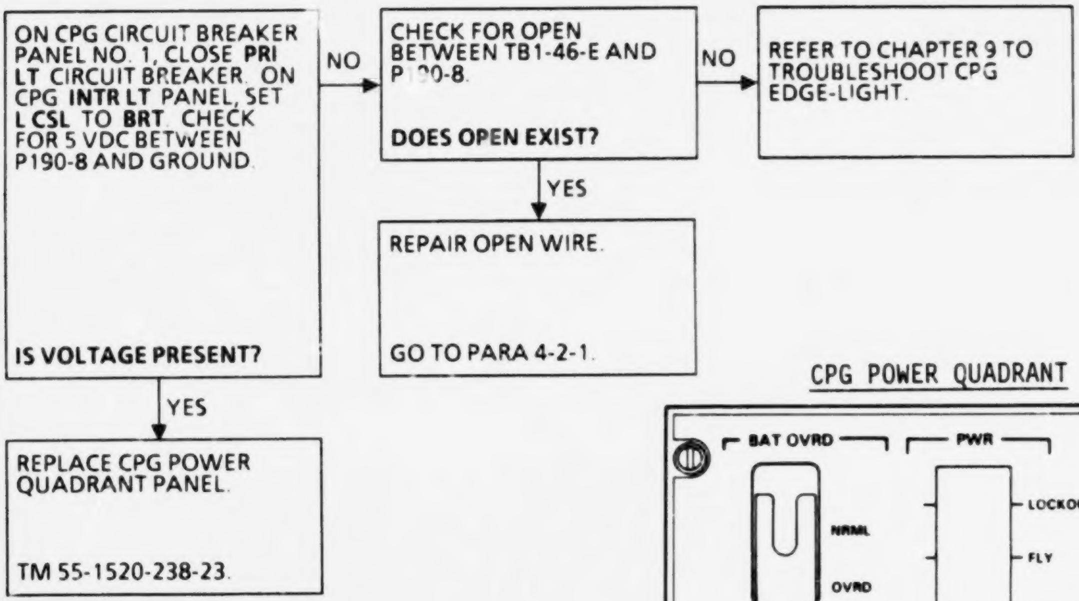
Personnel Required: (para 4-2-47)

References: (para 4-2-47)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	CPG Fuel panel - removed

REFER TO VOLTAGE WARNING



ON CPG CIRCUIT BREAKER PANEL NO. 1, CLOSE **PRI LT** CIRCUIT BREAKER. ON CPG **INTR LT** PANEL, SET **L CSL** TO **BRT**. CHECK FOR 5 VDC BETWEEN P190-8 AND GROUND.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN TB1-46-E AND P190-8.

DOES OPEN EXIST?

REFER TO CHAPTER 9 TO TROUBLESHOOT CPG EDGE-LIGHT.

REPAIR OPEN WIRE.

GO TO PARA 4-2-1.

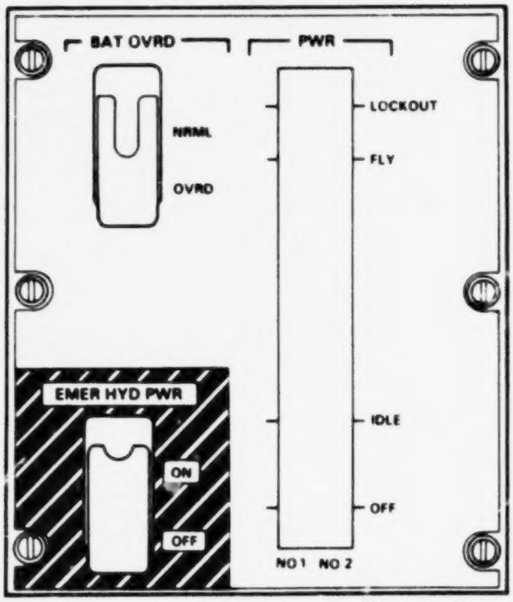
REPLACE CPG POWER QUADRANT PANEL.

TM 55-1520-238-23.

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

CPG POWER QUADRANT



MM04/1-1492

END OF TASK

4-3-1. TORQUE SHARING SYSTEM - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692

Personnel Required:

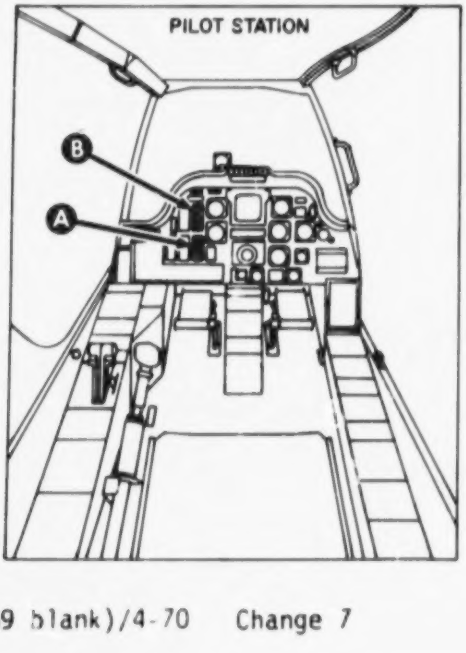
67R10 Attack Helicopter Repairer
100KG Pilot (2)

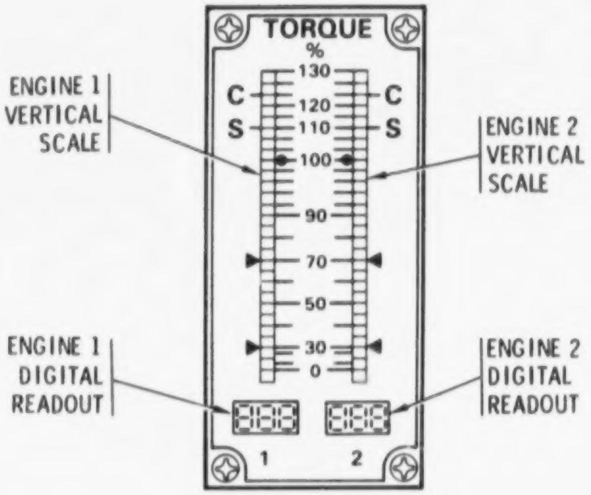
References:

TM 55-1520-238-CL
TM 55-1520-238-MTF
TM 55-2840-248-23
TM 55-1520-238-23

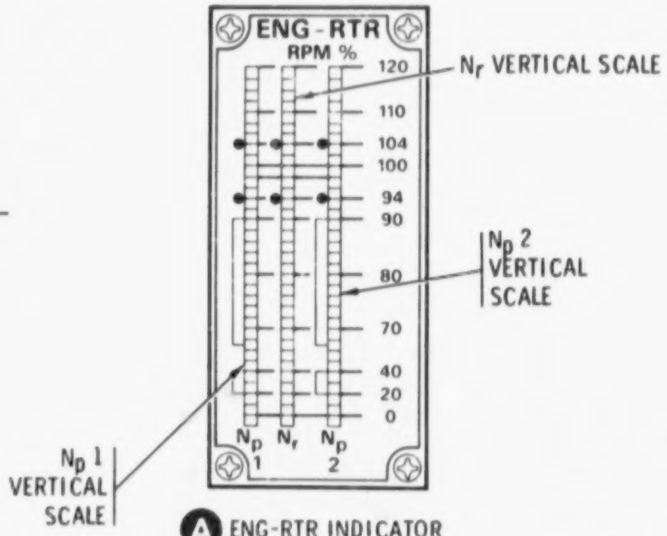
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Fuel system - fully serviced
TM 55-2840-248-23	Power plants inspection performed
Para 4-1-2	POWER PLANTS - POWER UP completed


PILOT STATION
B
A


TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
C
S
ENGINE 1 VERTICAL SCALE
ENGINE 2 VERTICAL SCALE
ENGINE 1 DIGITAL READOUT
ENGINE 2 DIGITAL READOUT
1
2

B TORQUE INDICATOR


ENG-RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
N_r VERTICAL SCALE
N_p 2 VERTICAL SCALE
N_p 1 VERTICAL SCALE
N_p 1
N_r
N_p 2

A ENG-RTR INDICATOR

MM04/1-1402

WARNING

- **Make sure helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance tasks. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and seek medical aid.**

A. Start and operate both engines (TM 55-1520-238-CL).

B. Complete the operational check as follows:

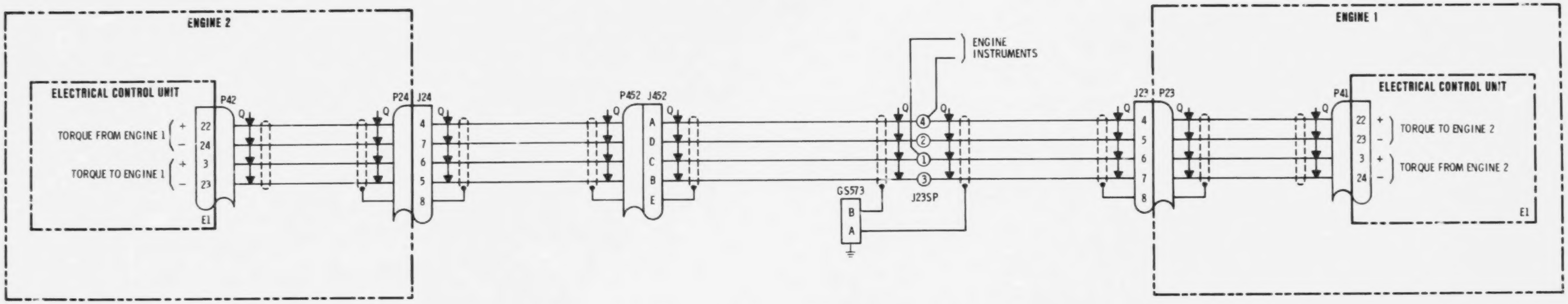
TASK	RESULT
1. With pilot **ENG-RTR RPM%** **Np1**, **Np2**, and **N_R** vertical scales all indicating **100%**. Slowly increase collective to establish "HELICOPTER LIGHT ON THE WHEELS" condition.	If **ENG-RTR RPM%** indications do not show **100%**, refer to chapter 8 to troubleshoot engine instruments.
2. Monitor **TORQUE %** **1** and **2** vertical scales and digital readouts. Indications are within 5% of each other.	If engine **1** torque indication is lower than engine **2** torque indication (indications not within 5% of each other), go to para 4-3-4. If engine **2** torque indication is lower than engine **1** torque indication (indications not within 5% of each other), go to para 4-3-5.
3. Perform limited test flight to verify TGT limiting power check (TM 55-1520-238-MTF).	

C. Land and shut down helicopter (TM 55-1520-238-CL).

D. Perform helicopter safing procedures (TM 55-1520-238-23).

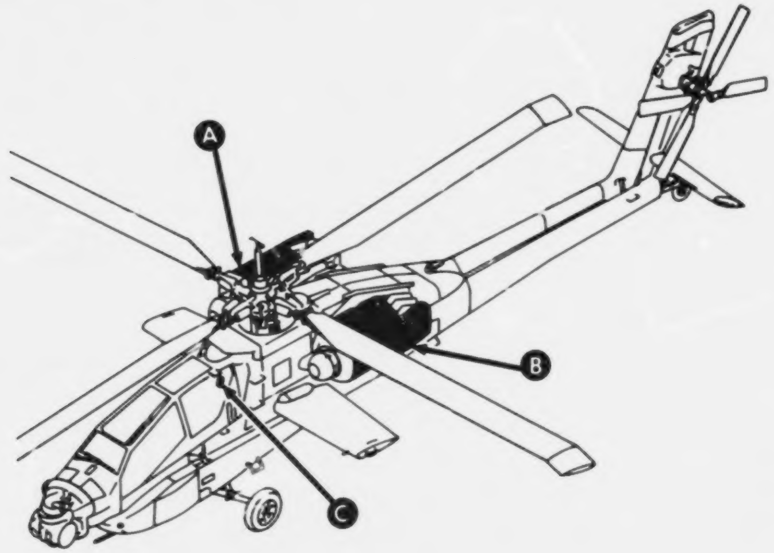
END OF TASK

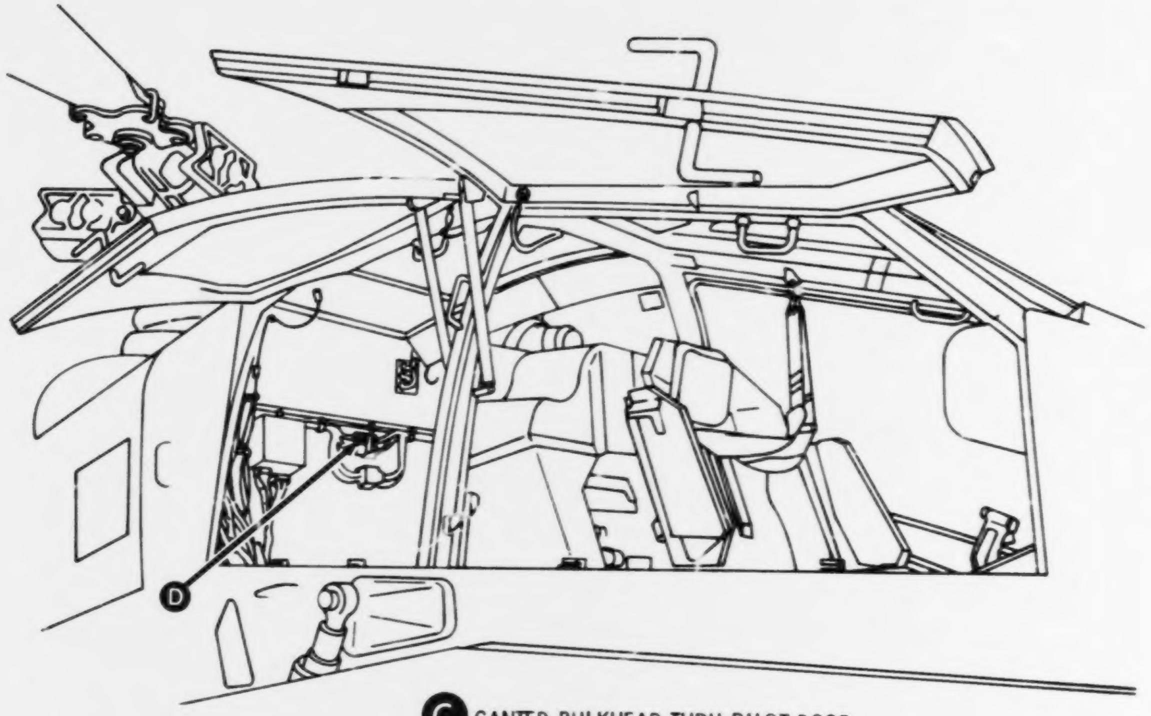
4-3-2 TORQUE SHARING SYSTEM - INTERCONNECTION DIAGRAM


ENGINE 2
ELECTRICAL CONTROL UNIT
TORQUE FROM ENGINE 1
+
−
TORQUE TO ENGINE 1
+
−
22
24
3
23
E1
P42
Q
P24
J24
4
7
6
5
8
P452
J452
A
D
C
B
E
ENGINE
INSTRUMENTS
④
②
①
③
J23SP
GS573
B
A
J23
P23
4
5
6
7
8
ENGINE 1
P41
ELECTRICAL CONTROL UNIT
22
23
3
24
+
−
TORQUE TO ENGINE 2
+
−
TORQUE FROM ENGINE 2
E1

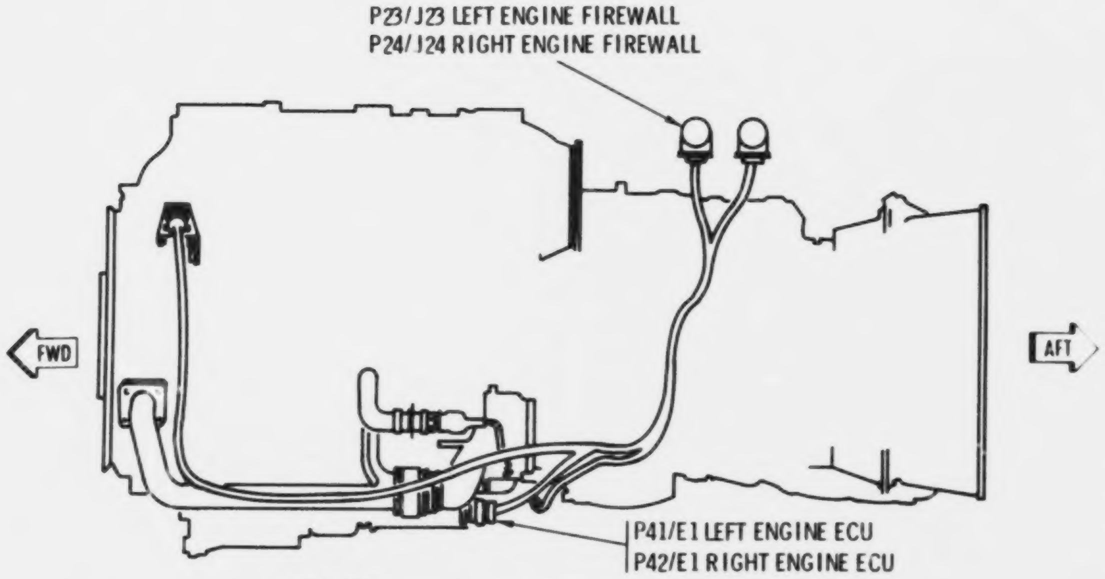
MM04/1-1403A

4-3-3. TORQUE SHARING SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION

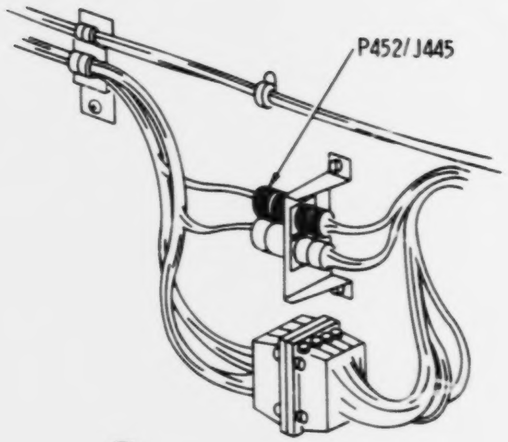




C CANTED BULKHEAD THRU PILOT DOOR


P23/J23 LEFT ENGINE FIREWALL
P24/J24 RIGHT ENGINE FIREWALL
FWD
AFT
P41/E1 LEFT ENGINE ECU
P42/E1 RIGHT ENGINE ECU

AB ENGINE LEFT SIDE SHOWN



D PILOT STATION REAR WALL

MM04/1-1404A

4-3-4. ENGINE 1 TORQUE INDICATION IS LOWER THAN ENGINE 2 TORQUE INDICATION (INDICATIONS NOT WITHIN 5% OF EACH OTHER)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

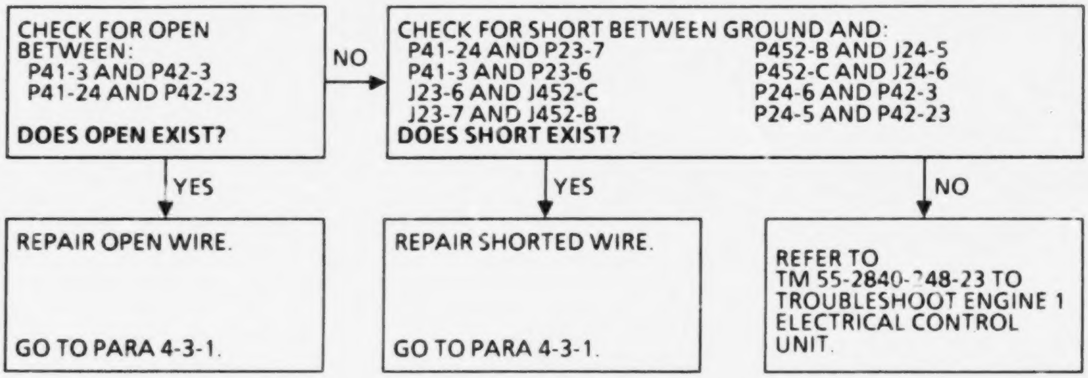
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN3, LN4, RN3, RN4 doors opened



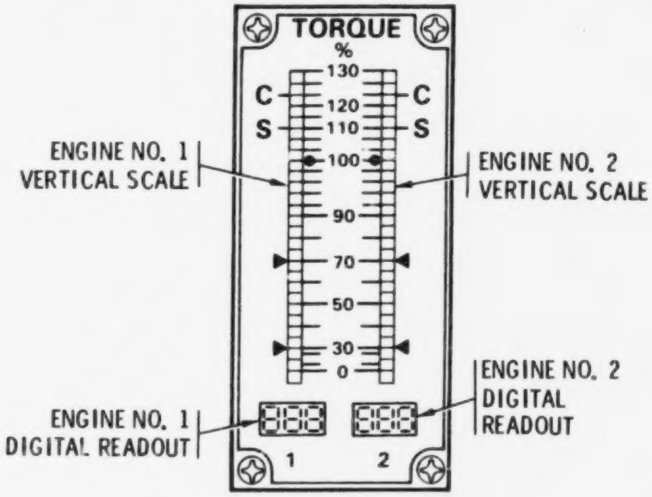
CHECK FOR OPEN BETWEEN:
P41-3 AND P42-3
P41-24 AND P42-23
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE. GO TO PARA 4-3-1.

NO: CHECK FOR SHORT BETWEEN GROUND AND:
P41-24 AND P23-7
P41-3 AND P23-6
J23-6 AND J452-C
J23-7 AND J452-B
P452-B AND J24-5
P452-C AND J24-6
P24-6 AND P42-3
P24-5 AND P42-23
DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 4-3-1.

NO: REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1 ELECTRICAL CONTROL UNIT.


TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
C
S
ENGINE NO. 1 VERTICAL SCALE
ENGINE NO. 2 VERTICAL SCALE
ENGINE NO. 1 DIGITAL READOUT
ENGINE NO. 2 DIGITAL READOUT
1
2

PILOT TORQUE INDICATOR

MM04/1-1405

END OF TASK

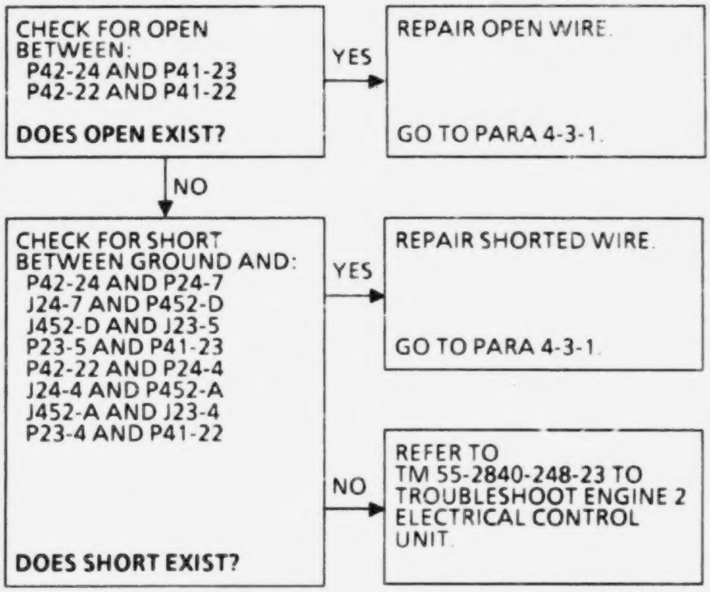
4-3-5. ENGINE 2 TORQUE INDICATION IS LOWER THAN ENGINE 1 TORQUE INDICATION (INDICATIONS NOT WITHIN 5% OF EACH OTHER)

Tools: (para 4-3-4)

Personnel Required: (para 4-3-4)

References: (para 4-3-4)

Equipment Conditions: (para 4-3-4)


CHECK FOR OPEN BETWEEN:
P42-24 AND P41-23
P42-22 AND P41-22
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 4-3-1.
NO
CHECK FOR SHORT BETWEEN GROUND AND:
P42-24 AND P24-7
J24-7 AND P452-D
J452-D AND J23-5
P23-5 AND P41-23
P42-22 AND P24-4
J24-4 AND P452-A
J452-A AND J23-4
P23-4 AND P41-22
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
GO TO PARA 4-3-1.
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2 ELECTRICAL CONTROL UNIT.

END OF TASK

CHAPTER 5. ROTORS

CHAPTER OVERVIEW

Chapter 5 contains the operational check and fault isolation procedures required for troubleshooting the rotor systems.

Rotor systems maintenance information for the AH-64A helicopter is contained in TM 55-1520-238-23.

Chapter 5 is divided into the following sections:

Section	Para	Title
I	5-1-1	Failure Symptom List
	5-1-2	Tab Adjustment Tools - Installation and Removal
II	5-2-1	Main Rotor Track and Balance - Operational Check
III	5-3-1	Tail Rotor Balance - Operational Check
IV	5-4-1	Track and Balance Charts - Main and Tail Rotor

5-1-1. ROTORS - FAILURE SYMPTOM LIST

Symptom	Go to Para
A. Main Rotor Track and Balance - Operational Check:	
1. Main rotor blade tab adjustment - blade goes out of track more than 2 inches between ground track (at 100 percent NR) and hover.	5-2-1
2. Main rotor blade tab adjustment - in-flight tracking.	5-2-1
3. Vibration in 45° bank turns - exceeds 0.75 IPS (at 110 KIAS).	5-2-1
B. Tail Rotor Balance - Operational Check:	5-3-1

5-1-2. TAB ADJUSTMENT TOOLS - INSTALLATION AND REMOVAL

Tools:

Nomenclature	Part Number (NSN)
Accessories Kit, Rotor Track and Balance	4920-01-180-7610

Personnel Required:

67R10 Attack Helicopter Repairer

---

a. **Install tab adjustments tools.**

1. Loosen wing nuts on tab bender.

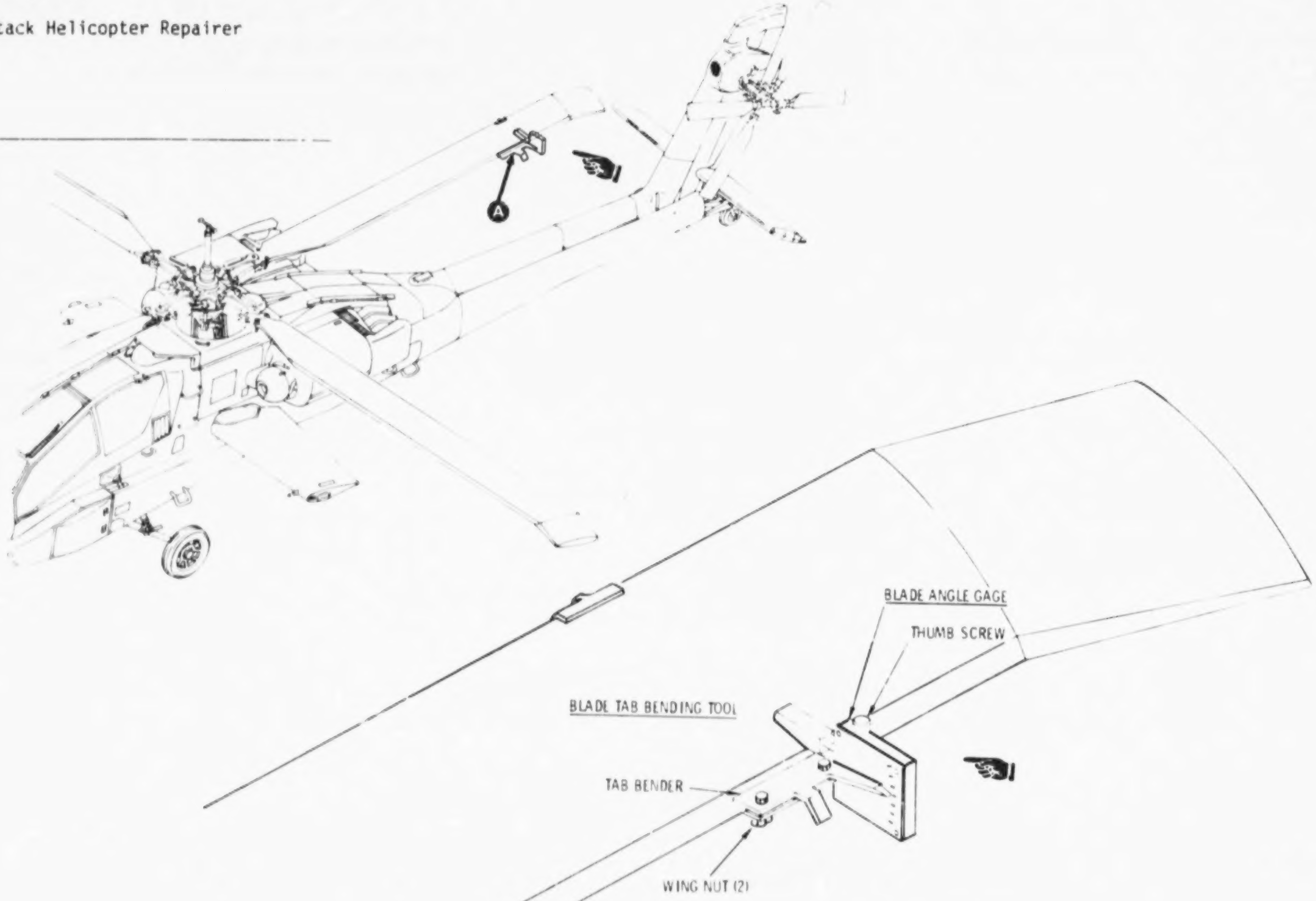
NOTE

Place tab adjustment tool in center of the tab station to make bends. Failure to comply may result in damage to the trim tab.

2. Slide tab bender onto trim tab station to be bent with pointer outboard.
3. Tighten wing nuts finger tight (2).
4. Slide blade angle gage onto blade.
5. Tighten thumb screw finger tight.

b. **Remove tab adjustment tools.**

1. Loosen wing nuts on tab bender.
2. Slide tab bender off tab.
3. Loosen thumb screw on blade angle gage.
4. Slide blade angle gage off blade.



Ⓐ TAB ADJUSTMENT TOOLS – INSTALLED

MM04/1-684A

END OF TASK

5-2-1. MAIN ROTOR - TRACK AND BALANCE OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Accessories Kit, Rotor Track and Balance	4920-01-180-7610
Kit, Rotor Track and Balance	4920-01-040-7816
Tool Kit, Aircraft Mechanic's	5180-00-323-4692

References:

TM 55-1520-238-CL
TM 55-1520-238-23
TM 55-1520-238-MTF
TM 55-4920-402-13&P

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Main rotor assembly inspection completed
	Main rotor blade droop angle check completed

Personnel Required:

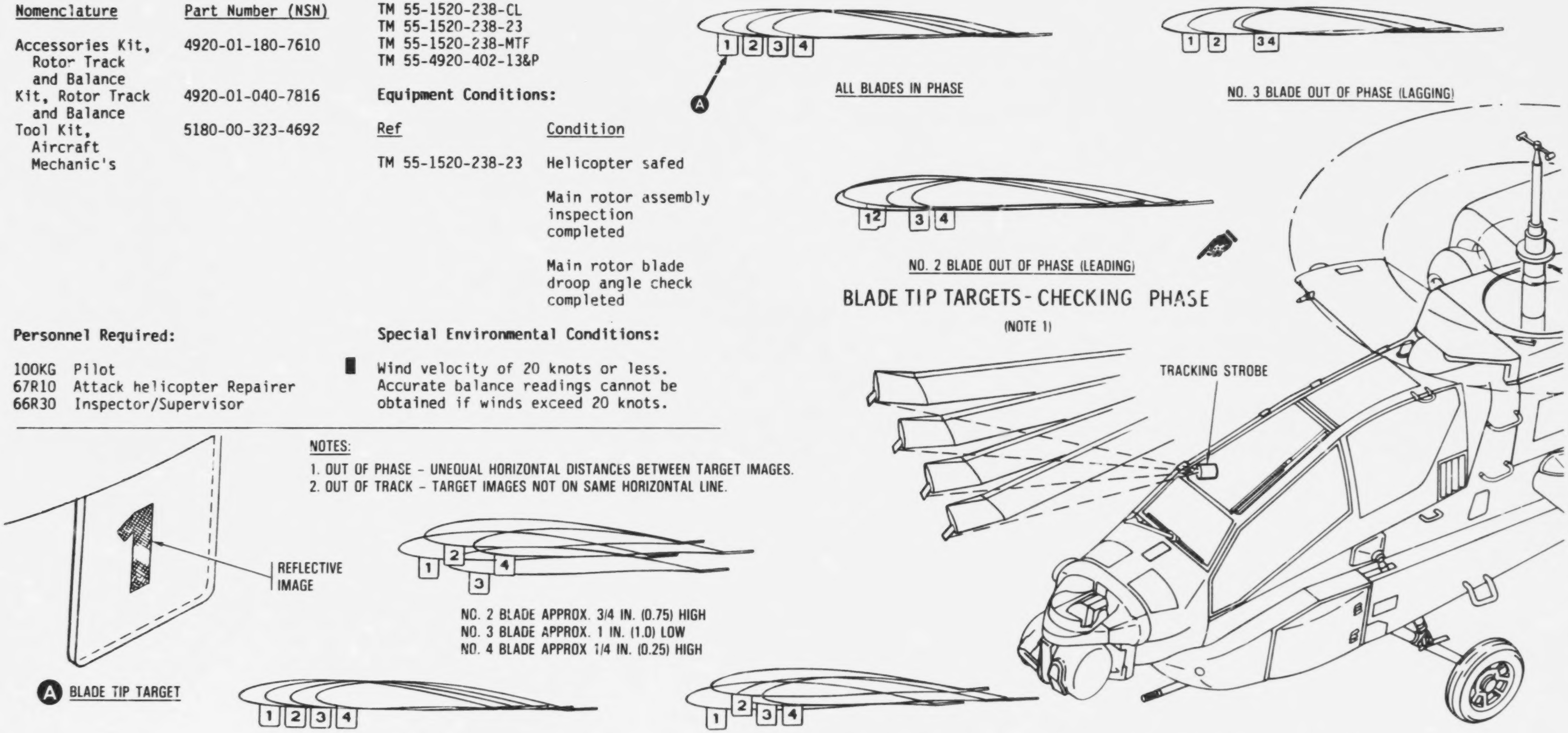
100KG	Pilot
67R10	Attack helicopter Repairer
66R30	Inspector/Supervisor

Special Environmental Conditions:

Wind velocity of 20 knots or less. Accurate balance readings cannot be obtained if winds exceed 20 knots.

NOTES:

1. OUT OF PHASE - UNEQUAL HORIZONTAL DISTANCES BETWEEN TARGET IMAGES.
2. OUT OF TRACK - TARGET IMAGES NOT ON SAME HORIZONTAL LINE.



ALL BLADES IN PHASE

NO. 3 BLADE OUT OF PHASE (LAGGING)

NO. 2 BLADE OUT OF PHASE (LEADING)

BLADE TIP TARGETS- CHECKING PHASE
(NOTE 1)

Ⓐ BLADE TIP TARGET

NO. 2 BLADE APPROX. 3/4 IN. (0.75) HIGH
NO. 3 BLADE APPROX. 1 IN. (1.0) LOW
NO. 4 BLADE APPROX 1/4 IN. (0.25) HIGH

ALL BLADES IN TRACK

NO. 2 BLADE APPROX. 1 IN. HIGH

BLADE TIP TARGETS-CHECKING TRACK
(NOTE 2)

BLADE TRACKING AND PHASING-CHECKS

MM04/1-542B

GO TO NEXT PAGE

5-2-1. MAIN ROTOR - TRACK AND BALANCE OPERATIONAL CHECK (cont)

NOTE

For additional information on operation of track and balance equipment, refer to TM 55-4920-402-13&P.

A. Install main rotor track and balance kit (TM 55-1520-238-23).

B. Complete the operational check as follows:

CAUTION

Do not increase to, or remain at, 100% rpm if lateral vibration (ground rock) becomes excessive. Severe damage to helicopter can result.

NOTE

Ground tracking of the main rotor can be accomplished using only one engine.

TASK	RESULT
1. Start helicopter and increase rotor rpm to 100% to stabilize dampers (TM 55-1520-238-CL).	

NOTE

The target can be located quickly by searching the rotor tip path in a small "W" pattern. On bright hazy days, the target may become more difficult to distinguish. The 135 M-11 Strobex may then be switched to "B" mode to obtain a higher intensity flash.

TASK	RESULT
2. Set balancer **FUNCTION** switch to **TRACK.** Ground track rotor at 100 percent **NR** with helicopter headed into the wind. View the targets in front of the helicopter with the strobex. Targets should appear at approximately 11:30 position of rotor tip path plane. Observe and record track and phase (reflected image) of main rotor tip path.	If blade tip targets are out of phase, refer to main rotor blade phase adjustment (TM 55-1520-238-23). If blade tip targets are out of track more than 1/4 inch of each other, adjust pitch links per step 3. If blade tip targets track within 1/4 inch of each other, go to step 4.

TASK	RESULT
3. Adjust Pitch Links	
a. Mark barrel and upper rod end with single vertical line for reference.	
b. Cut lockwire securing jam nuts to barrel of pitch link to be adjusted.	
c. Loosen upper jam nut while holding barrel of pitch link.	
d. Loosen lower jam nut while holding barrel.	

NOTE

- To determine which way to turn the pitch link barrel to raise or lower the blade, grasp the barrel with right hand thumb extended up, turning the barrel the same direction as your fingers are pointed will raise the blade up. Turning barrel in the opposite direction will lower the blade. Turning barrel one flat will raise or lower the blade approximately 1/2 to 1 inch.
- Shortening the pitch link moves the blade down, lengthening it moves the blade up.

TASK	RESULT
e. Turn barrel in direction necessary to raise or lower blade the determined amount.	
f. Tighten jam nuts and torque to **900 INCH-POUNDS.**	
g. Safety jam nuts.	
h. Recheck track of blades.	

GO TO NEXT PAGE

5-2-1. MAIN ROTOR - TRACK AND BALANCE OPERATIONAL CHECK (cont)

TASK	RESULT
4. Set balancer **FUNCTION** switch to **CHANNEL A.** Set switch box rotary switch to **MAIN ROTOR LATERAL.** Hover helicopter with rotor RPM at 100% NR. Record balance IPS and clock angle.	If IPS is more than 0.3, land and shut down helicopter. Correct balance by installing or removing blade weights (TM 55-1520-238-23) as indicated on balance chart. Repeat step 4. If lateral balance can not be reduced to 0.3 IPS or less by adding the maximum number of weights, an inspection of the dampers and rotor head should be performed (TM 55-1520-238-23).

NOTE

- Establish the reference blade (i.e. the most stable rotor blade) as early in the tracking procedure as possible.
- Minor changes to the pitch links may be required to prevent excessive tab bending, such as, a blade that is high or low at all forward speeds including hover.
- Adjust only the most out of track blade for each flight run. Adjacent blades may affect each other when their track is within 3/4 of an inch.
- Track changes affect lateral balance. Check balance after any track change and adjust if IPS exceeds 0.3.
- Adjustment is made by bending the trailing edge tab of the affected blade 1 degree for each 1/2 to 1 inch change in track. Tab sections are 10 inches in length and start inboard of the static wick. Bend tab section down to move blade down, up to move blade up.

TASK	RESULT
5. Set balance **FUNCTION** switch to **TRACK.** Hover helicopter. Observe track (reflected image) of main rotor tip path and record track.	If a blade goes out of track over 2 inches between ground track (at 100 percent NR) and hover track, land and shut down helicopter. Adjust tab(s) on out of track blade(s), go to para 5-2-2. If track vertical spread is 2 inches or less but greater than 1/2 inch, adjust out of track blade(s) per step 3. If track is within 1/2 inches of each other, proceed to step 6.

TASK	RESULT
6. With balancer **FUNCTION** switch set to **TRACK.** Fly helicopter straight and level at 60 knots indicated airspeed (KIAS). Observe track and record.	If track vertical spread is more than 3 inches at 60 KIAS, land and shut down helicopter. Adjust tab(s) on out of track blade(s) (para 5-2-3).
7. Fly helicopter straight and level at 80 KIAS. Observe track and record.	If track vertical spread is more than 3 inches at 80 KIAS, land and shut down helicopter. Adjust tab(s) on out of track blade(s) (para 5-2-3). Repeat steps 6 and 7.
8. Fly helicopter straight and level at 100 KIAS. Observe track and record.	If track vertical speed is more than 3 inches at 100 KIAS, land and shut down helicopter. Adjust tab(s) on out of track blade(s) (para 5-2-3). Repeat steps 6 thru 8.

GO TO NEXT PAGE

5-2-1. MAIN ROTOR - TRACK AND BALANCE OPERATIONAL CHECK (cont)

TASK	RESULT
9. Fly helicopter straight and level at 120 KIAS. Observe track and record.	If track vertical spread is more than 3 inches at 120 KIAS, land and shut down helicopter. Adjust tab(s) on out-of-track blade(s) (para 5-2-3). Repeat steps 6 thru 9.
10. Fly helicopter straight and level at 140 KIAS. Observe track and record.	If track vertical spread is more than 3 inches at 140 KIAS, land and shut down heliocpter. Adjust tab(s) on out-of-track blade(s) (para 5-2-3). Repeat steps 6 thru 10.
11. Fly helicopter straight and level at 160 KIAS or V_H, whichever is lower. Observe track and record.	If track vertical spread is more than 3 inches at V_H land and shut down helicopter. Adjust tab(s) on out-of-track blade(s) (para 5-2-3). Repeat steps 6 thru 11.

NOTE

Adjustments made to pitch links change visual track. A track vertical spread of more than 1/2 inch is acceptable if **MAIN ROTOR VERTICAL** IPS is 0.3 or below.

12. Repeat steps 5 thru 11 and adjust the track until the rotor blades are within 1/2 inch of each other. From hover thru 160 KIAS or V_H.

	TASK	RESULT
13.	Set **FUNCTION** switch to **CHANNEL A.** Set rotary switch on switch box to **MAIN ROTOR LATERAL.** Perform 45° bank turns at 110 KIAS, take balance reading and record. Set rotary switch on switch box to **MAIN ROTOR VERTICAL**, take balance reading and record.	If IPS exceeds 0.76 in either **MAIN ROTOR LATERAL** or **MAIN ROTOR VERTICAL** balance readings, go to para 5-2-4.
14.	Repeat step 4 to verify final lateral balance in a hover does not exceed 0.3 IPS.	

C. Perform limited test flight, including autorotational rpm check (TM 55-1520-238-MTF).

D. Shut down helicopter (TM 55-1520-238-CL).

E. Remove track and balance equipment (TM 55-1520-238-23).

END OF TASK

5-2-2. MAIN ROTOR BLADE TAB ADJUSTMENT - BLADE GOES OUT OF TRACK MORE THAN 2 INCHES BETWEEN GROUND TRACK (AT 100 PERCENT NR) AND HOVER

Tools:

Nomenclature	Part Number (NSN)
Accessories Kit, Track and Balance	4920-01-180-7610

Personnel Required:

100KG	Pilot
67R10	Attack Helicopter Repairer
66R30	Inspector/Supervisor

References:

TM 55-1520-238-CL

CAUTION

- Do not bend a tab more than 5° up or down from 0° reference on tab bending tool gage block. Failure to observe maximum allowable trim tab adjustment may result in damage to the main rotor blade trailing edge.

- Place tab adjustment tool in the center of the tab bend pocket which is to be bent. Tab tracking locations #0 through #10 are 10 inches in length, starting 6 inches inboard of swept tip. Do not bend tabs inboard of pocket #10.

- Do not make bends in opposite directions in adjacent pockets. It is preferable to remove an upward bend (reset to 'Zero' Degrees) if the adjacent pocket requires a downward bend.

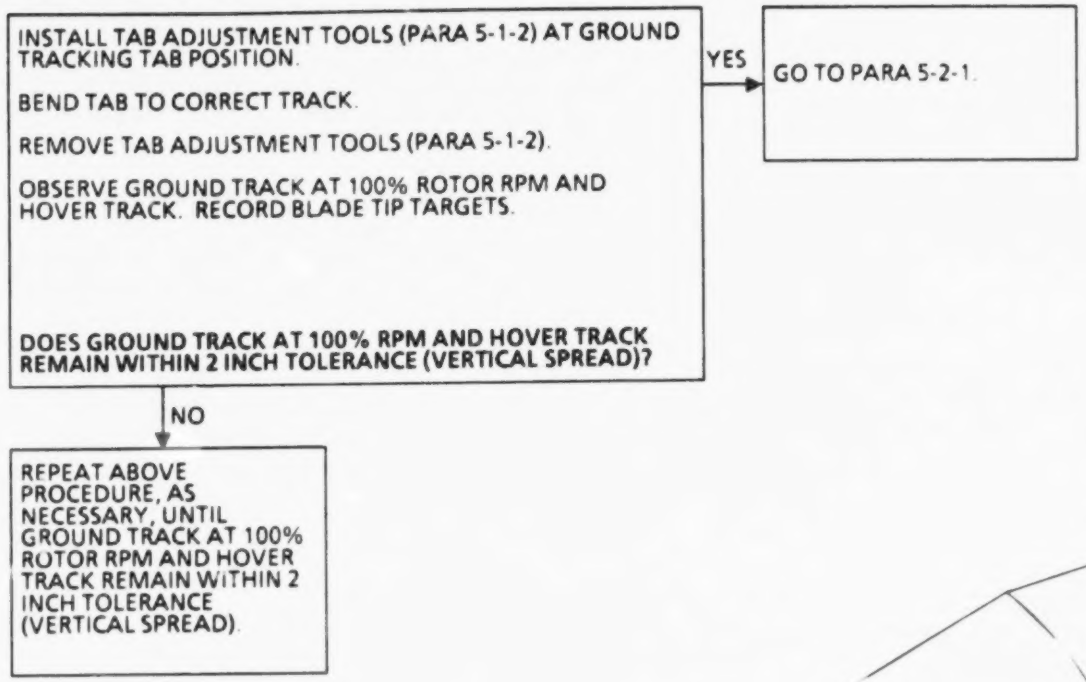
- Any noticeable deformity (kinks or sharp edges caused by the tab bending tool) is cause for rejection of the blade.

NOTE

- One degree of tab bend changes track approximately 1/2 to 1 inch. Bending tabs up-moves the blade up. Bending tabs down-moves the blade down.

- It is preferable to make two 1-degree bends in adjacent stations rather than one 2-degree bend in one station.

- Keep the bending to a minimum. Bending tabs at out board stations tends to make the blade unstable at higher speeds.



INSTALL TAB ADJUSTMENT TOOLS (PARA 5-1-2) AT GROUND TRACKING TAB POSITION.

BEND TAB TO CORRECT TRACK.

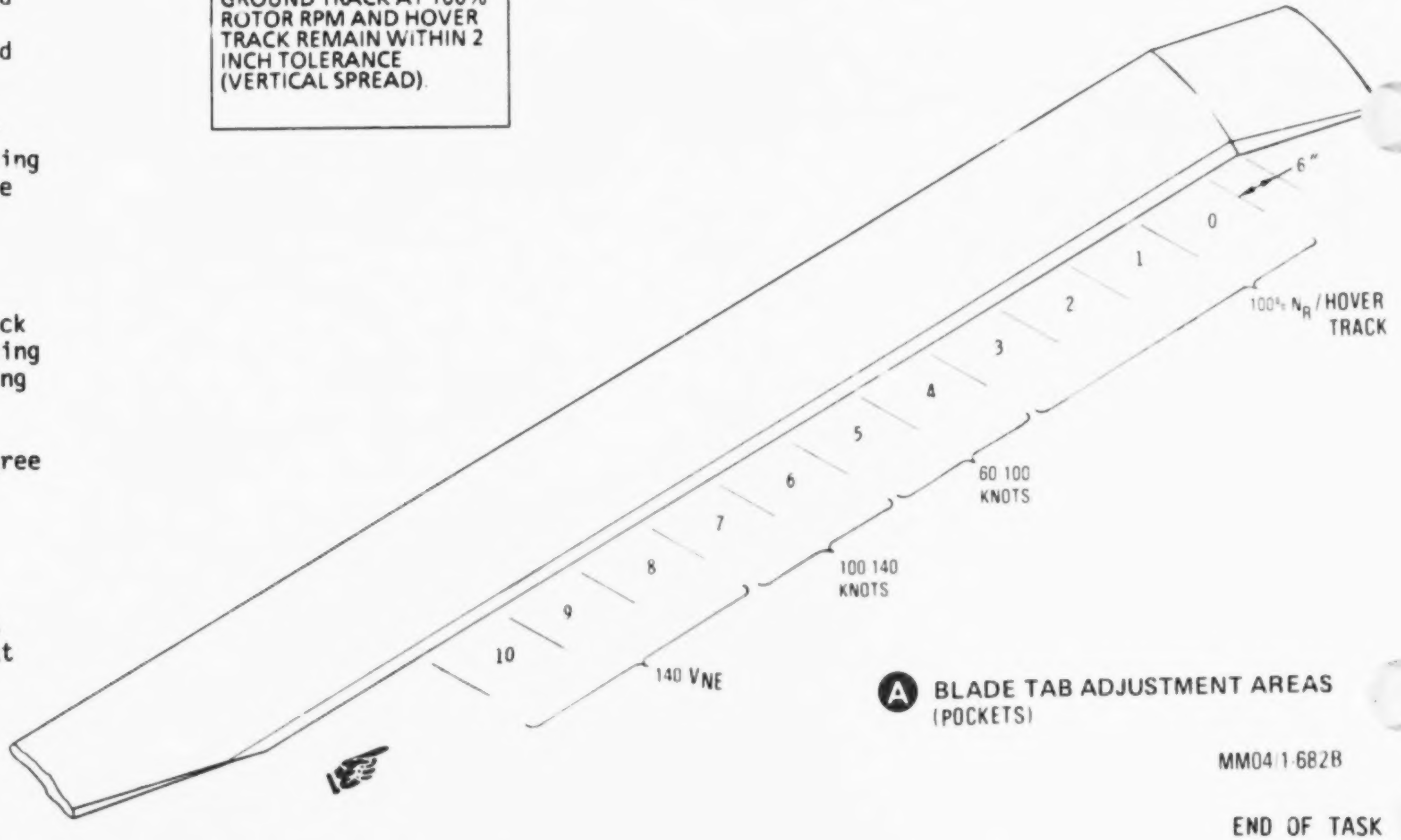
REMOVE TAB ADJUSTMENT TOOLS (PARA 5-1-2).

OBSERVE GROUND TRACK AT 100% ROTOR RPM AND HOVER TRACK. RECORD BLADE TIP TARGETS.

DOES GROUND TRACK AT 100% RPM AND HOVER TRACK REMAIN WITHIN 2 INCH TOLERANCE (VERTICAL SPREAD)?

YES: GO TO PARA 5-2-1.

NO: REPEAT ABOVE PROCEDURE, AS NECESSARY, UNTIL GROUND TRACK AT 100% ROTOR RPM AND HOVER TRACK REMAIN WITHIN 2 INCH TOLERANCE (VERTICAL SPREAD).



Ⓐ BLADE TAB ADJUSTMENT AREAS (POCKETS)

END OF TASK

5-2-3. MAIN ROTOR BLADE TAB ADJUSTMENT - IN-FLIGHT TRACKING

Tools:

Nomenclature	Part Number (NSN)
Accessories Kit, Track and Balance	4920-01-180-7610

Personnel Required:

100KG Pilot
67R10 Attack Helicopter Repairer
67R30 Inspector/Supervisor

References:

TM 55-1520-238-CL

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter Operating

WARNING

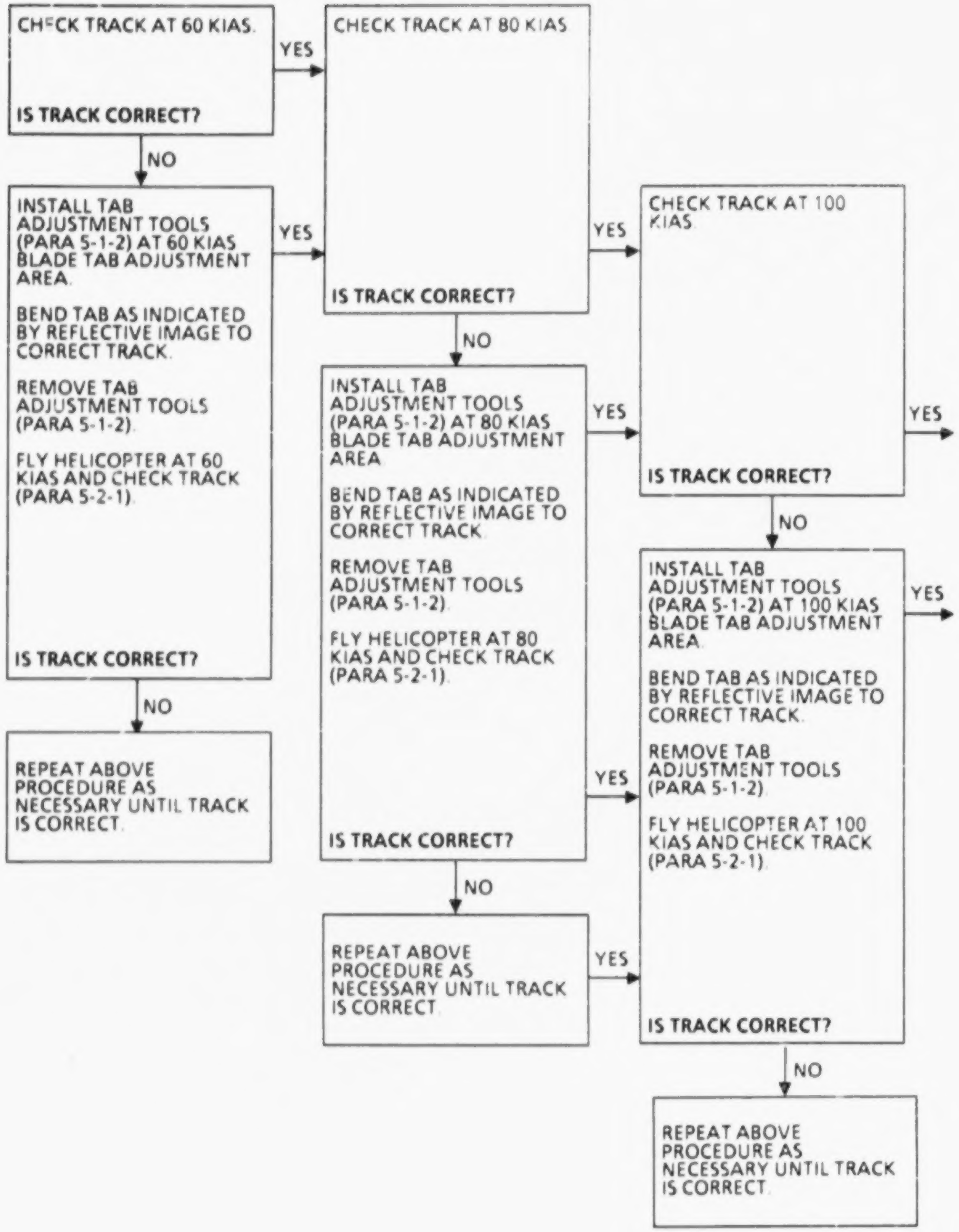
Do not exceed any airspeed at which excessive vibration is present. Excessive vibration may result in rotor blade delamination or distortion. Make track corrections before continuing.

CAUTION

- Do not bend a tab more than 5° up or down from 0° reference on tab bending tool gage block. Failure to observe maximum allowable trim tab adjustment may result in damage to the main rotor blades trailing edge.
- Place tab adjustment tool in the center of the tab bend pocket which is to be bent. Tab tracking locations #0 through #10 are 10 inches in length, starting 6 inches inboard of swept tip. Do not bend tabs inboard of pocket #10.
- Do not make bends in opposite directions in adjacent pockets. It is preferable to remove an upward bend (reset to 'Zero' degrees) if the adjacent pocket requires a downward bend.
- Any noticeable deformity (kinks or sharp edges caused by the tab bending tool) is cause for rejection of the blade.

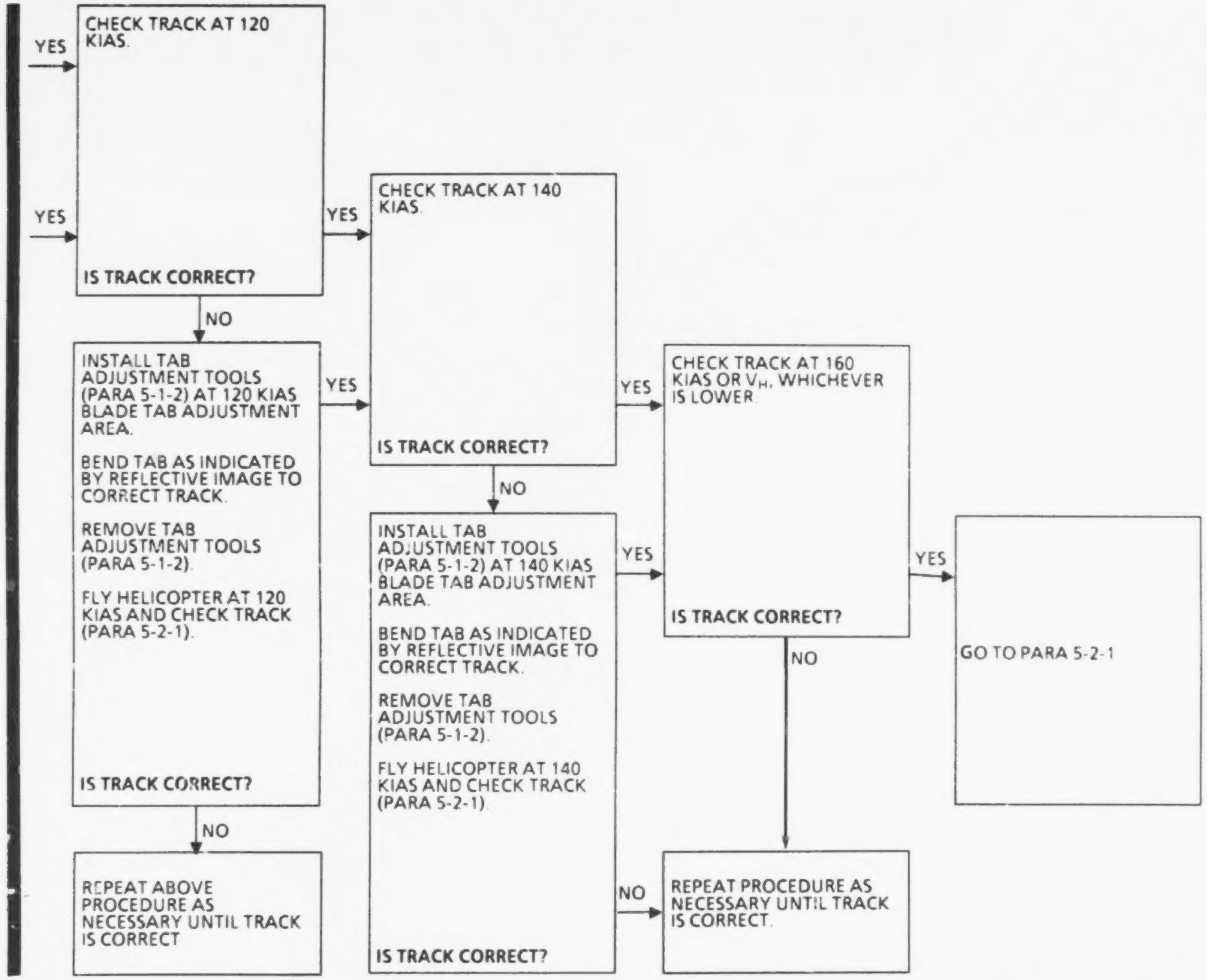
NOTE

- One degree of tab bend changes track approximately 1/2 to 1 inch. Bending tabs up-moves the blade up. Bending tabs down-moves the blade down.
- It is preferable to make two 1-degree bends in adjacent stations rather than one 2-degree bend in one station.


CHECK TRACK AT 60 KIAS. IS TRACK CORRECT?
YES
NO
INSTALL TAB ADJUSTMENT TOOLS (PARA 5-1-2) AT 60 KIAS BLADE TAB ADJUSTMENT AREA. BEND TAB AS INDICATED BY REFLECTIVE IMAGE TO CORRECT TRACK. REMOVE TAB ADJUSTMENT TOOLS (PARA 5-1-2). FLY HELICOPTER AT 60 KIAS AND CHECK TRACK (PARA 5-2-1). IS TRACK CORRECT?
YES
NO
REPEAT ABOVE PROCEDURE AS NECESSARY UNTIL TRACK IS CORRECT.
CHECK TRACK AT 80 KIAS. IS TRACK CORRECT?
YES
NO
INSTALL TAB ADJUSTMENT TOOLS (PARA 5-1-2) AT 80 KIAS BLADE TAB ADJUSTMENT AREA. BEND TAB AS INDICATED BY REFLECTIVE IMAGE TO CORRECT TRACK. REMOVE TAB ADJUSTMENT TOOLS (PARA 5-1-2). FLY HELICOPTER AT 80 KIAS AND CHECK TRACK (PARA 5-2-1). IS TRACK CORRECT?
YES
YES
NO
REPEAT ABOVE PROCEDURE AS NECESSARY UNTIL TRACK IS CORRECT.
YES
CHECK TRACK AT 100 KIAS. IS TRACK CORRECT?
YES
NO
INSTALL TAB ADJUSTMENT TOOLS (PARA 5-1-2) AT 100 KIAS BLADE TAB ADJUSTMENT AREA. BEND TAB AS INDICATED BY REFLECTIVE IMAGE TO CORRECT TRACK. REMOVE TAB ADJUSTMENT TOOLS (PARA 5-1-2). FLY HELICOPTER AT 100 KIAS AND CHECK TRACK (PARA 5-2-1). IS TRACK CORRECT?
YES
NO
REPEAT ABOVE PROCEDURE AS NECESSARY UNTIL TRACK IS CORRECT.

GO TO NEXT PAGE

5-2-3. MAIN ROTOR BLADE TAB ADJUSTMENT - IN-FLIGHT TRACKING (cont)



CHECK TRACK AT 120 KIAS.

IS TRACK CORRECT?

INSTALL TAB ADJUSTMENT TOOLS (PARA 5-1-2) AT 120 KIAS BLADE TAB ADJUSTMENT AREA.

BEND TAB AS INDICATED BY REFLECTIVE IMAGE TO CORRECT TRACK.

REMOVE TAB ADJUSTMENT TOOLS (PARA 5-1-2).

FLY HELICOPTER AT 120 KIAS AND CHECK TRACK (PARA 5-2-1).

IS TRACK CORRECT?

REPEAT ABOVE PROCEDURE AS NECESSARY UNTIL TRACK IS CORRECT

CHECK TRACK AT 140 KIAS.

IS TRACK CORRECT?

INSTALL TAB ADJUSTMENT TOOLS (PARA 5-1-2) AT 140 KIAS BLADE TAB ADJUSTMENT AREA.

BEND TAB AS INDICATED BY REFLECTIVE IMAGE TO CORRECT TRACK.

REMOVE TAB ADJUSTMENT TOOLS (PARA 5-1-2).

FLY HELICOPTER AT 140 KIAS AND CHECK TRACK (PARA 5-2-1).

IS TRACK CORRECT?

CHECK TRACK AT 160 KIAS OR V_H, WHICHEVER IS LOWER

IS TRACK CORRECT?

REPEAT PROCEDURE AS NECESSARY UNTIL TRACK IS CORRECT.

GO TO PARA 5-2-1

END OF TASK

5-2-4. VIBRATION IN 45° BANK TURNS AT 110 KIAS EXCEEDS 0.76 IPS

Tools:

Nomenclature	Part Number (NSN)
Accessories Kit, Rotor Track and Balance	4920-01-180-7610
Kit, Rotor Track and Balance	4920-01-040-7816
Tool Kit, Aircraft Mechanic's	5180-00-323-4915

References:

TM 55-1520-238-CL
TM 55-1520-238-23
TM 55-4920-402-13&P

Equipment Conditions:

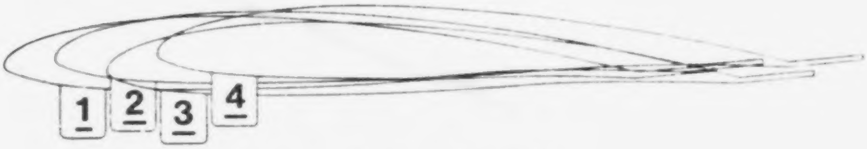
Ref	Condition
TM 55-1520-238-23	Main rotor assembly inspection performed
	Main rotor blade droop angle check performed

Personnel Required:

100KG	Pilot
67R10	Attack Helicopter Repairer
66R30	Supervisor/Inspector

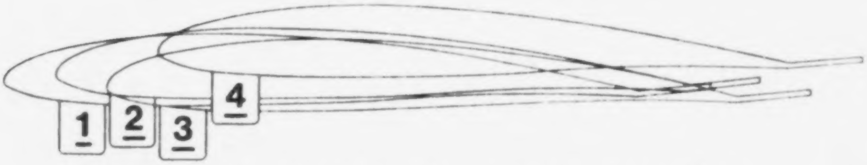
Special Environmental Conditions:

Wind velocity of 20 knots or less. Accurate balance readings cannot be obtained if winds exceed 20 knots.



TRACK AT 110 KIAS

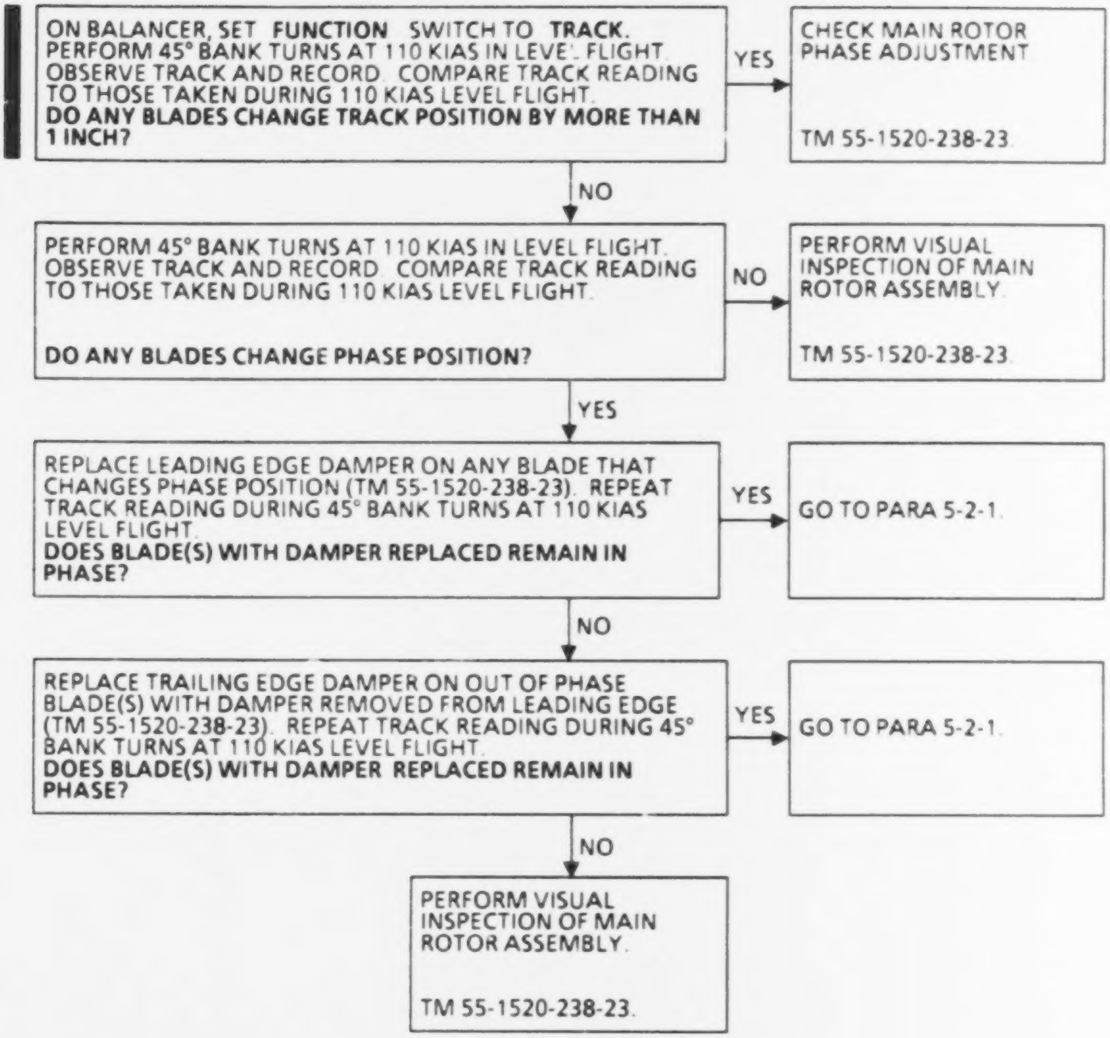
NOTES: TYPICAL TRACK PICTURE AFTER IN FLIGHT TRACKING AT MAIN ROTOR VERTICAL POSITION ON SWITCH BOX .



TRACK AT 110 KIAS - 45^{0} BANK TURN - OUT OF TRACK

NOTES: IPS EXCEED 0.76 IN MAIN ROTOR VERTICAL POSITION ON SWITCH BOX. TRACK SHOWS BLADE NUMBER 4 CHANGES MORE THAT 1 INCH FROM 110 KIAS STRAIGHT AND LEVEL FLIGHT.

5-2-4


ON BALANCER, SET **FUNCTION** SWITCH TO **TRACK.** PERFORM 45° BANK TURNS AT 110 KIAS IN LEVEL FLIGHT. OBSERVE TRACK AND RECORD. COMPARE TRACK READING TO THOSE TAKEN DURING 110 KIAS LEVEL FLIGHT. **DO ANY BLADES CHANGE TRACK POSITION BY MORE THAN 1 INCH?**

YES: CHECK MAIN ROTOR PHASE ADJUSTMENT. TM 55-1520-238-23.

NO:

PERFORM 45° BANK TURNS AT 110 KIAS IN LEVEL FLIGHT. OBSERVE TRACK AND RECORD. COMPARE TRACK READING TO THOSE TAKEN DURING 110 KIAS LEVEL FLIGHT.

DO ANY BLADES CHANGE PHASE POSITION?

NO: PERFORM VISUAL INSPECTION OF MAIN ROTOR ASSEMBLY. TM 55-1520-238-23.

YES:

REPLACE LEADING EDGE DAMPER ON ANY BLADE THAT CHANGES PHASE POSITION (TM 55-1520-238-23). REPEAT TRACK READING DURING 45° BANK TURNS AT 110 KIAS LEVEL FLIGHT. **DOES BLADE(S) WITH DAMPER REPLACED REMAIN IN PHASE?**

YES: GO TO PARA 5-2-1.

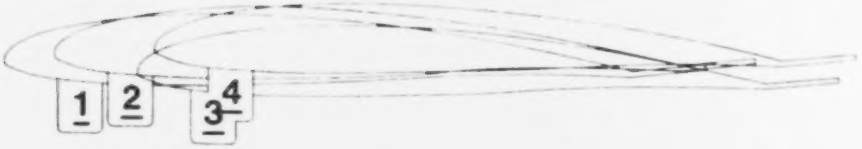
NO:

REPLACE TRAILING EDGE DAMPER ON OUT OF PHASE BLADE(S) WITH DAMPER REMOVED FROM LEADING EDGE (TM 55-1520-238-23). REPEAT TRACK READING DURING 45° BANK TURNS AT 110 KIAS LEVEL FLIGHT. **DOES BLADE(S) WITH DAMPER REPLACED REMAIN IN PHASE?**

YES: GO TO PARA 5-2-1.

NO:

PERFORM VISUAL INSPECTION OF MAIN ROTOR ASSEMBLY. TM 55-1520-238-23.



TRACK AT 110 KIAS - 45° BANK TURN - OUT OF PHASE

NOTES: IPS EXCEEDS 0.76 IN MAIN ROTOR LATERAL POSITION ON SWITCH BOX. TRACK SHOWS BLADE NUMBER 3 OUT OF PHASE (LAGGING) IN 45° TURN BUT NOT IN 110 KIAS STRAIGHT AND LEVEL FLIGHT.

MM04/1-910

END OF TASK

5-3-1. TAIL ROTOR BALANCE - OPERATIONAL CHECK

Tools

Nomenclature	Part Number (NSN)
Accessories Kit, Rotor Track and Balance	4920-01-180-7610
Kit, Rotor Track and Balance	4920-01-040-7816
Tool Kit, Aircraft Mehcanic's	5180-00-323-4692

Personnel Required:

100KG	Pilot
67R10	Attack Helicopter Repairer
66R30	Supervisor/Inspector

References:

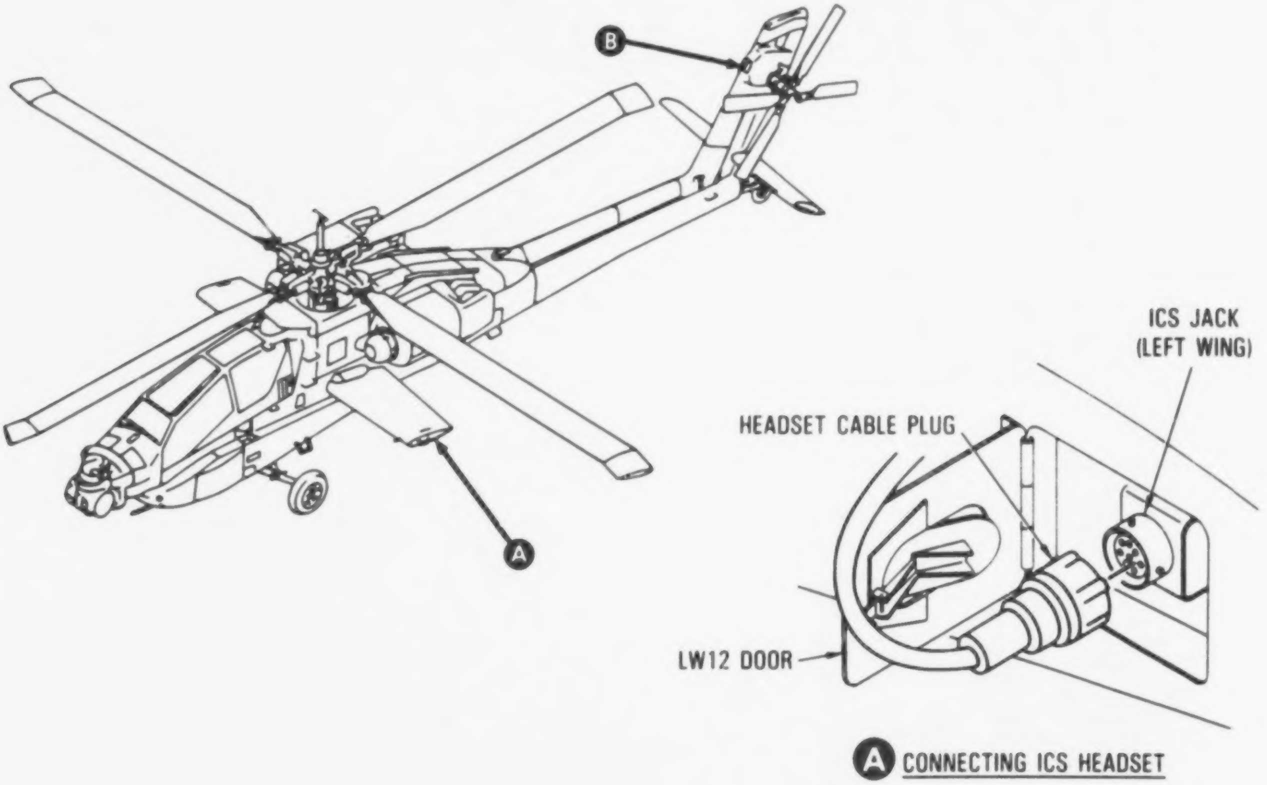
TM 55-1520-238-CL
TM 55-1520-238-23
TM 55-4920-402-13&P

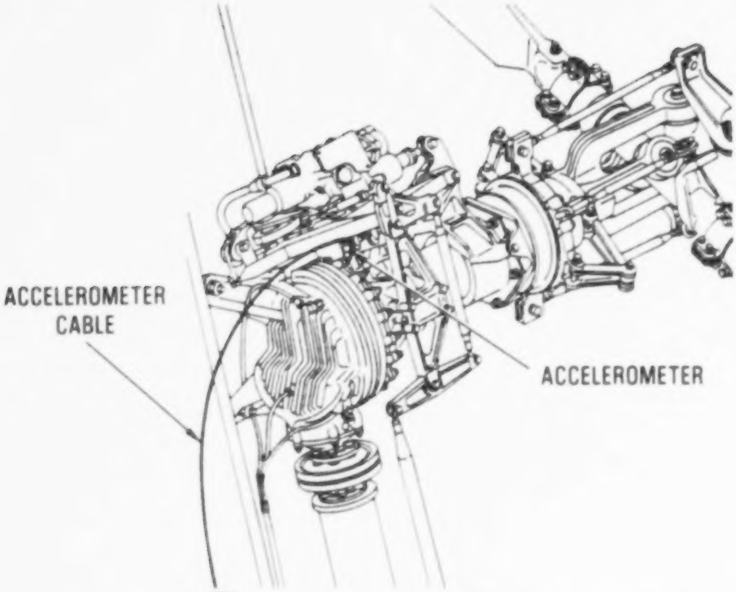
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected

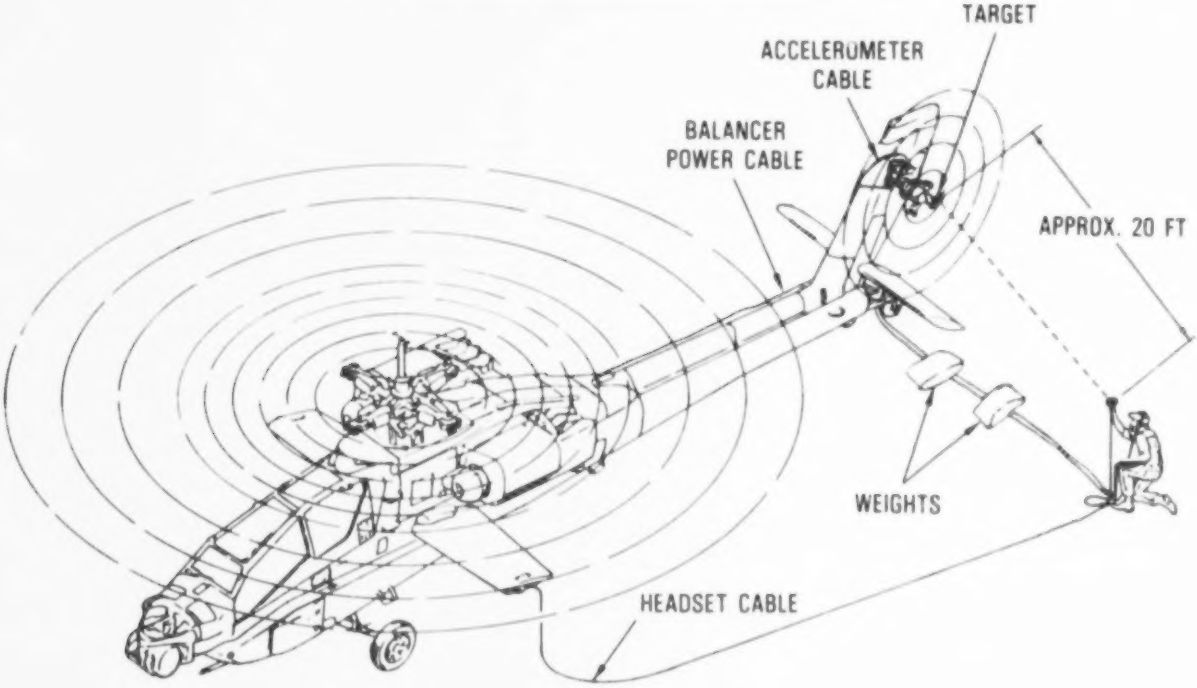
Special Environmental Conditions:

Wind velocity of 20 knots or less. Accurate balance readings cannot be obtained if winds exceed 20 knots.


B
A
ICS JACK (LEFT WING)
HEADSET CABLE PLUG
LW12 DOOR
A CONNECTING ICS HEADSET


ACCELEROMETER CABLE
ACCELEROMETER

B TAIL ROTOR ACCELEROMETER INSTALLATION


TARGET
ACCELEROMETER CABLE
BALANCER POWER CABLE
APPROX. 20 FT
WEIGHTS
HEADSET CABLE

TAIL ROTOR BALANCING

MM04/1-683A

GO TO NEXT PAGE

5-3-1. TAIL ROTOR BALANCE - OPERATIONAL CHECK (cont)

NOTE

For additional information on operation of track and balance equipment, refer to TM 55-4920-402-13&P.

A. Perform tail rotor system visual check (TM 55-1520-238-PMD).

B. Perform tail rotor assembly inspection (TM 55-1520-238-23).

C. Install track and balance kit (TM 55-1520-238-23).

D. Complete the operational check as follows:

TASK	RESULT

WARNING

During tail rotor balancing procedures, observe all safety precautions and stay as clear of tail rotor as conditions permit. Failure to do so could result in death or serious injury.

TASK	RESULT
1. Connect headset plug to left wing ICS jack.	
2. Route balancer and headset cables to a position 20 feet to the left of the tail rotor.	

CAUTION

Use weights on balancer and headset cables and secure excess cable at balancer to prevent cables from becoming tangled in tail rotor.

TASK	RESULT
3. Start engines and increase rotor rpm to 100% (TM 55-1520-238-CL).	
4. Using **TAIL ROTOR BALANCE** position on adapter module, take a balance reading (TM 55-4920-402-13&P).	If IPS reading exceeds 0.2, shut down helicopter. Correct balance by adjusting tail rotor blade weights (TM 55-1520-238-23). Repeat step 4.

NOTE

Do not make more than one adjustment per run. Make only the largest adjustment indicated each time.

E. Shut down helicopter (TM 55-1520-238-CL).

F. Remove track and balance kit (TM 55-1520-238-23).

END OF TASK

5-4-1. TRACK AND BALANCE CHARTS - MAIN AND TAIL ROTOR

Tools:

Nomenclature	Part Number (NSN)
Accessories Kit, Rotor Track and Balance	4920-01-180-7610
Kit, Rotor Track and Balance	4920-01-040-7816
Tool Kit, Aircraft Mechanic's	5180-00-323-4692

Personnel Required:

67R10	Attack Helicopter Repairer
66R30	Supervisor/Inspector

References:

TM 55-1520-238-23
TM 55-4920-402-13&P

Equipment Conditions:

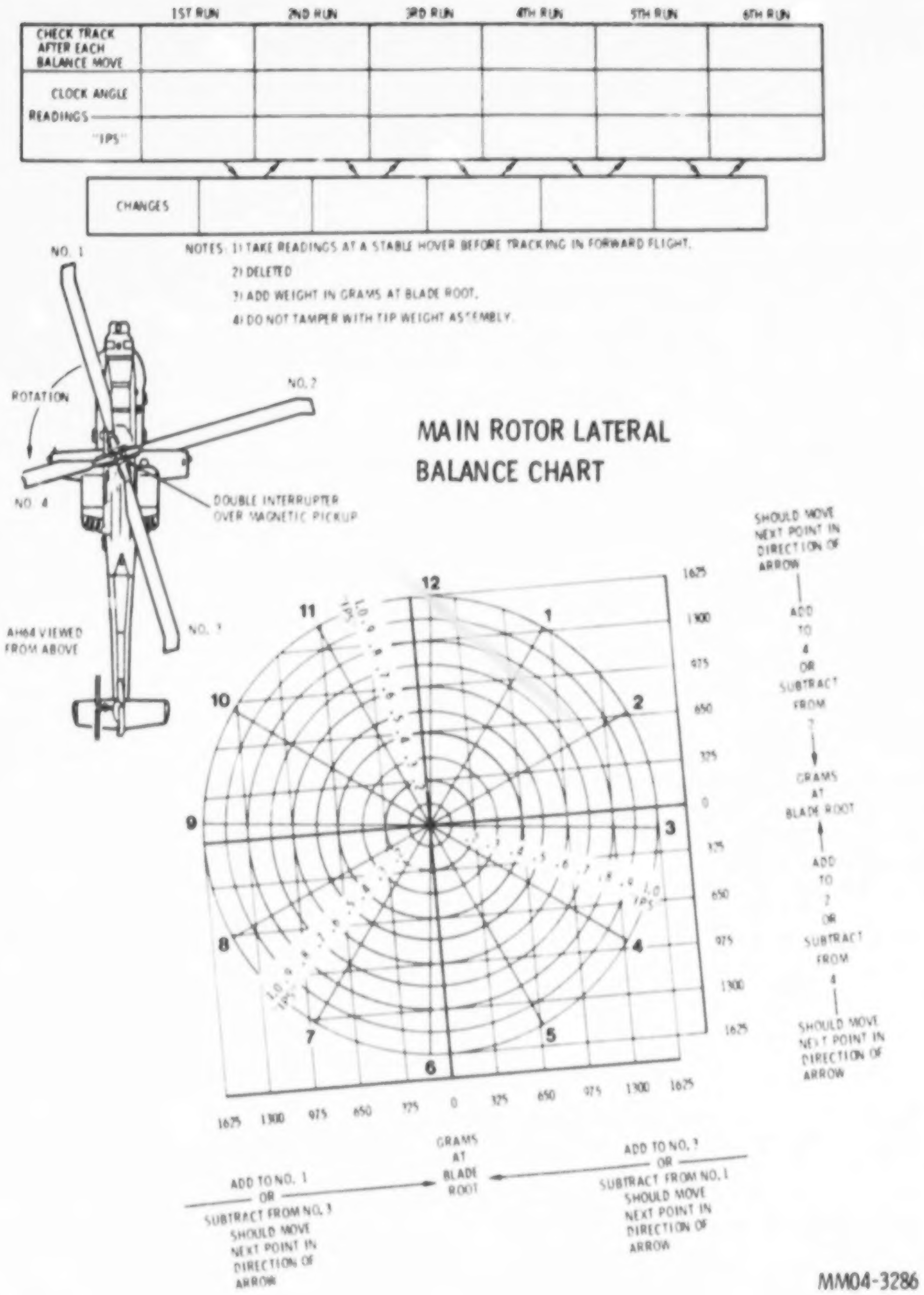
Ref	Condition
TM 55-1520-238-23	Main rotor assembly inspection performed

Special Environmental Conditions:

Wind velocity of 20 knots or less. Accurate balance readings cannot be obtained if winds exceed 20 knots.

NOTE

- Refer to TM 55-4920-402-13&P for further information on the use of balance charts and track and balance equipment.
- If the initial IPS reading exceeds 1.0 (outside outer ring on chart), divide the IPS reading by a number that will give a result less than 1.0. Plot this new number on the chart. The chart indicated weight change is then multiplied by the number divided by initially. This gives the required balance weight to add to blade.



		1ST RUN	2ND RUN	3RD RUN	4TH RUN	5TH RUN	6TH RUN
CHECK TRACK AFTER EACH BALANCE MOVE							
READINGS	CLOCK ANGLE						
	"IPS"						
CHANGES							

NOTES: 1) TAKE READINGS AT A STABLE HOVER BEFORE TRACKING IN FORWARD FLIGHT.
2) DELETED
3) ADD WEIGHT IN GRAMS AT BLADE ROOT.
4) DO NOT TAMPER WITH TIP WEIGHT ASSEMBLY.

MAIN ROTOR LATERAL BALANCE CHART

NO. 1
NO. 2
NO. 3
NO. 4
ROTATION
DOUBLE INTERRUPTER OVER MAGNETIC PICKUP
AH64 VIEWED FROM ABOVE
12
1
2
3
4
5
6
7
8
9
10
11
1.0 IPS
1625
1300
975
650
325
0
325
650
975
1300
1625
SHOULD MOVE NEXT POINT IN DIRECTION OF ARROW
ADD TO 4 OR SUBTRACT FROM 2
GRAMS AT BLADE ROOT
ADD TO 2 OR SUBTRACT FROM 4
SHOULD MOVE NEXT POINT IN DIRECTION OF ARROW
ADD TO NO. 1 OR SUBTRACT FROM NO. 3 SHOULD MOVE NEXT POINT IN DIRECTION OF ARROW
GRAMS AT BLADE ROOT
ADD TO NO. 3 OR SUBTRACT FROM NO. 1 SHOULD MOVE NEXT POINT IN DIRECTION OF ARROW

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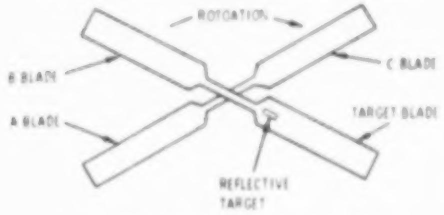
5-4-1. TRACK AND BALANCE CHARTS - MAIN AND TAIL ROTOR (cont)

TAIL ROTOR BALANCE CHART

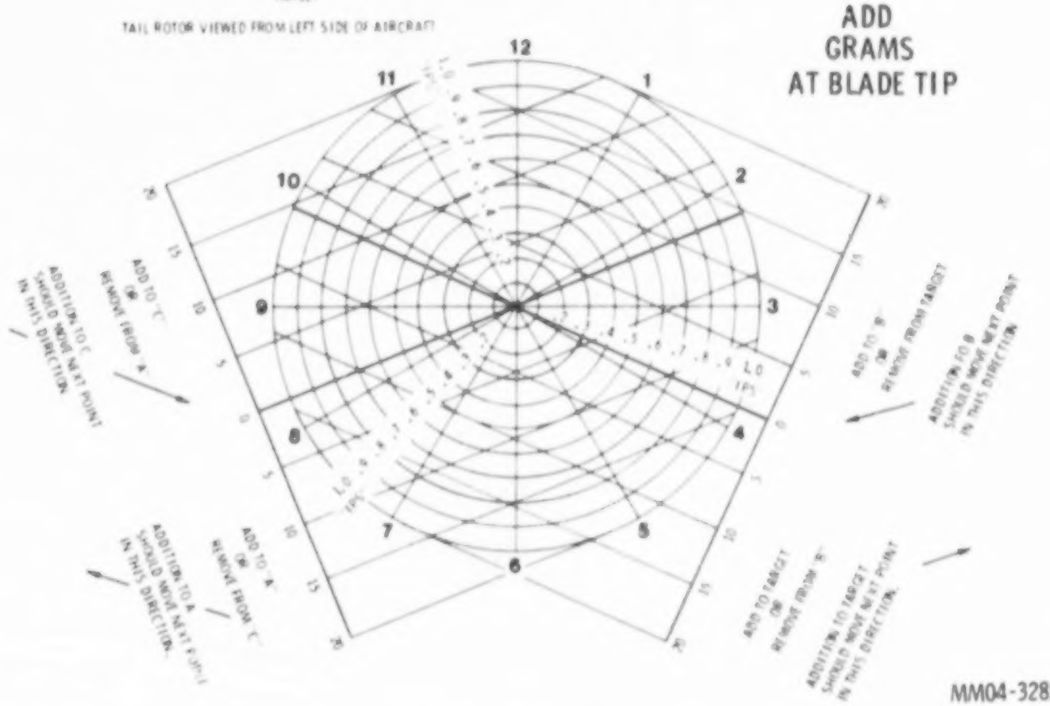
	1ST RUN	2ND RUN	3RD RUN	4TH RUN	5TH RUN
CLOCK ANGLE READINGS					
"IPS"					

CHANGES	TARGET				
	A BLADE				
	B BLADE				
	C BLADE				


ROTOATION
B BLADE
C BLADE
A BLADE
TARGET BLADE
REFLECTIVE TARGET

TAIL ROTOR VIEWED FROM LEFT SIDE OF AIRCRAFT

NOTES:
1) TAIL ROTOR TURNS 1400 RPM AT 100 NR. SET BALANCER TUNER TO 140 TIMES 10.
2) TAKE READINGS WITH RUDDER PEDALS CENTERED FROM VERTICAL ACCELEROMETER ADDED TO TAIL ROTOR GEARBOX.
3) WEIGHT ADDITION REQUIRES REMOVAL AND REPLACEMENT OF BLADE TIP CAP.
4) PHAZOR INDICATIONS ARE MEANINGLESS DURING TAIL ROTOR BALANCE.


ADD GRAMS AT BLADE TIP
12
1
2
3
4
5
6
7
8
9
10
11
.2 .3 .4 .5 .6 .7 .8 .9 1.0
IPS
0
5
10
15
20
ADD TO "C" OR REMOVE FROM "A"
ADDITION TO C SHOULD MOVE NEXT POINT IN THIS DIRECTION.
ADD TO "B" OR REMOVE FROM TARGET
ADDITION TO B SHOULD MOVE NEXT POINT IN THIS DIRECTION.
ADD TO "A" OR REMOVE FROM "C"
ADDITION TO A SHOULD MOVE NEXT POINT IN THIS DIRECTION.
ADD TO TARGET OR REMOVE FROM "B"
ADDITION TO TARGET SHOULD MOVE NEXT POINT IN THIS DIRECTION.

MM04-3285

A. Troubleshooting Other Vibrations:

- If, after tracking and balancing, other vibrations are felt, the VIBREX may be used for troubleshooting.

- Four-per-rev vibration from the main rotor will always be present, and increases with airspeed.

- The source of other vibration may be determined by securing an accelerometer on the area of noticed disturbance. Then, by tuning the "RPM TUNE" dial through the range of interest until the "IPS" meter peaks, the RPM (frequency) of the disturbance can usually be determined.

- Almost always, the troublesome vibration will be caused by some rotating element. The frequency, or vibration rate, in the airframe will be the same as the RPM of the rotating element, or some multiple (harmonic) of it. Probably the most important capability of this troubleshooting is the detection, and correction of the vibration caused by shaft run out and out-of-balance. Another area of interest is "gear clash" or tooth engagement rate, in gearboxes and transmissions. Sometimes a very high frequency vibration can be clearly related to the tooth engagement rate.

The following component operational R. P. M. s will facilitate vibration location:

Rotating Component	RPM
Main rotor 1 per rev	289
Main trans. sun gear	1,581
Main rotor 4 per rev	1,156
Tail rotor 1 per rev	1,403
Tail rotor 2 per rev	2,806
Tail rotor 4 per rev	5,612
Tail rotor drive shaft (main gearbox to intermediate)	4,815
Tail rotor drive shaft (intermediate to 90 degree gearbox)	3,636
Engine output shaft	20,952
Main transmission input shafts	9,841
Main transmission output ring gear	39,882
Tail rotor grarbox gear mesh rate	79,992
Engine N1	42,000
Engine N2	21,000

CHAPTER 6. DRIVE SYSTEM

CHAPTER OVERVIEW

Chapter 6 contains the operational checks and fault isolation procedures required for troubleshooting the drive system.

Drive system maintenance information is in TM 55-1520-238-23.

Chapter 6 is divided into the following sections:

	Para	Title
Section I consists of the following troubleshooting procedures for the drive system:		
	6-1-1	Failure Symptom List
	6-1-6	Drive System - FD/LS Check
Section II	6-2-1	Drive System - Indicators Operational Check
Section III	6-3-1	Drive System - Vibration Operational Check
Section IV	6-4-1	Drive System - Dynamic Operational Check

6-1-1. DRIVE SYSTEM - FAILURE SYMPTOM LIST

Symptom	Go to Para
A. Drive System - FD/LS Check:	
1. FD/LS **NGB1** oil pressure display - is not **OOLB**.	6-1-6
2. FD/LS **XMN1** oil pressure display - is not **OOLB**.	6-1-6
3. FD/LS **XMN2** oil pressure display - is not **OOLB**.	6-1-6
4. FD/LS **NGB2** oil pressure display - is not **OOLB**.	6-1-6
5. FD/LS **NGB1** oil temperature display - does not indicate **-31** degrees C.	6-1-6
6. FD/LS **XMN1** oil temperature display - is not **-31** degrees C.	6-1-6
7. FD/LS **XMN2** oil temperature display - is not **-31** degrees C.	6-1-6
8. FD/LS **NGB2** oil temperature display - is not **-31** degrees C.	6-1-6
B. Drive System - Indicators Operational Check:	
1. **OIL PSI ACC PUMP** indicator - does not light with electrical power applied and all power plants off.	6-2-1
2. **CHIPS MAIN XMSN** indicator - lights.	6-2-1
3. **OIL HOT MAIN XMSN 1** indicator - lights.	6-2-1
4. **OIL HOT MAIN XMSN 2** indicator - lights.	6-2-1
5. **OIL PSI MAIN XMSN 1** indicator - does not light with electrical power applied and all power plants off.	6-2-1
6. **OIL PSI MAIN XMSN 2** indicator - does not light with electrical power applied and all power plants off.	6-2-1
7. **TEMP INT** indicator - lights.	6-2-1
8. **TEMP TR** indicator - lights.	6-2-1
9. **OIL HOT NOSE GRBX 1** indicator - lights.	6-2-1
10. **OIL HOT NOSE GRBX 2** indicator - lights.	6-2-1
11. **OIL PSI NOSE GRBX 1** indicator - does not light with electrical power applied and all power plants off.	6-2-1
12. **OIL PSI NOSE GRBX 2** indicator - does not light with electrical power applied and all power plants off.	6-2-1
13. **CHIPS NOSE GRBX 1** indicator - lights.	6-2-1
14. **CHIPS NOSE GRBX 2** indicator - lights.	6-2-1

Symptom	Go to Para
15. Pilot **LOW RPM ROTOR** indicator - does not light with electrical power applied and all power plants off.	6-2-1
16. CPG **LOW RPM ROTOR** indicator - does not light with electrical power applied and all power plants off.	6-2-1
17. **HIGH RPM ROTOR** indicator - lights.	6-2-1
18. **ENG CUT** circuit breaker - does not stay closed.	6-2-1
19. **VIB GRBX** indicator - lights.	6-2-1
20. **OIL PSI ACC PUMP** indicator - lights.	6-2-1
21. **VIB MON** circuit breaker (CB79) - does not stay closed.	6-2-1
22. **ENG START** circuit breaker (CB58) - does not stay closed.	6-2-1

C. Drive System Vibration - Operational Check:

Symptom	Go to Para
1. **LOW RPM ROTOR** indicators - remain lighted above 93 percent N_R.	6-3-1
2. Pilot **LOW RPM ROTOR** indicator - does not light.	6-3-1
3. CPG **LOW RPM ROTOR** indicator - does not light.	6-3-1
4. Pilot **HIGH RPM ROTOR** indicator - does not light at **104** percent N_R.	6-3-1
5. CPG **HIGH RPM ROTOR** indicator - does not light at **104** percent N_R.	6-3-1
6. **VIB GRBX** indicator - lights.	6-3-1

D. Drive System - Dynamic Operational Check:

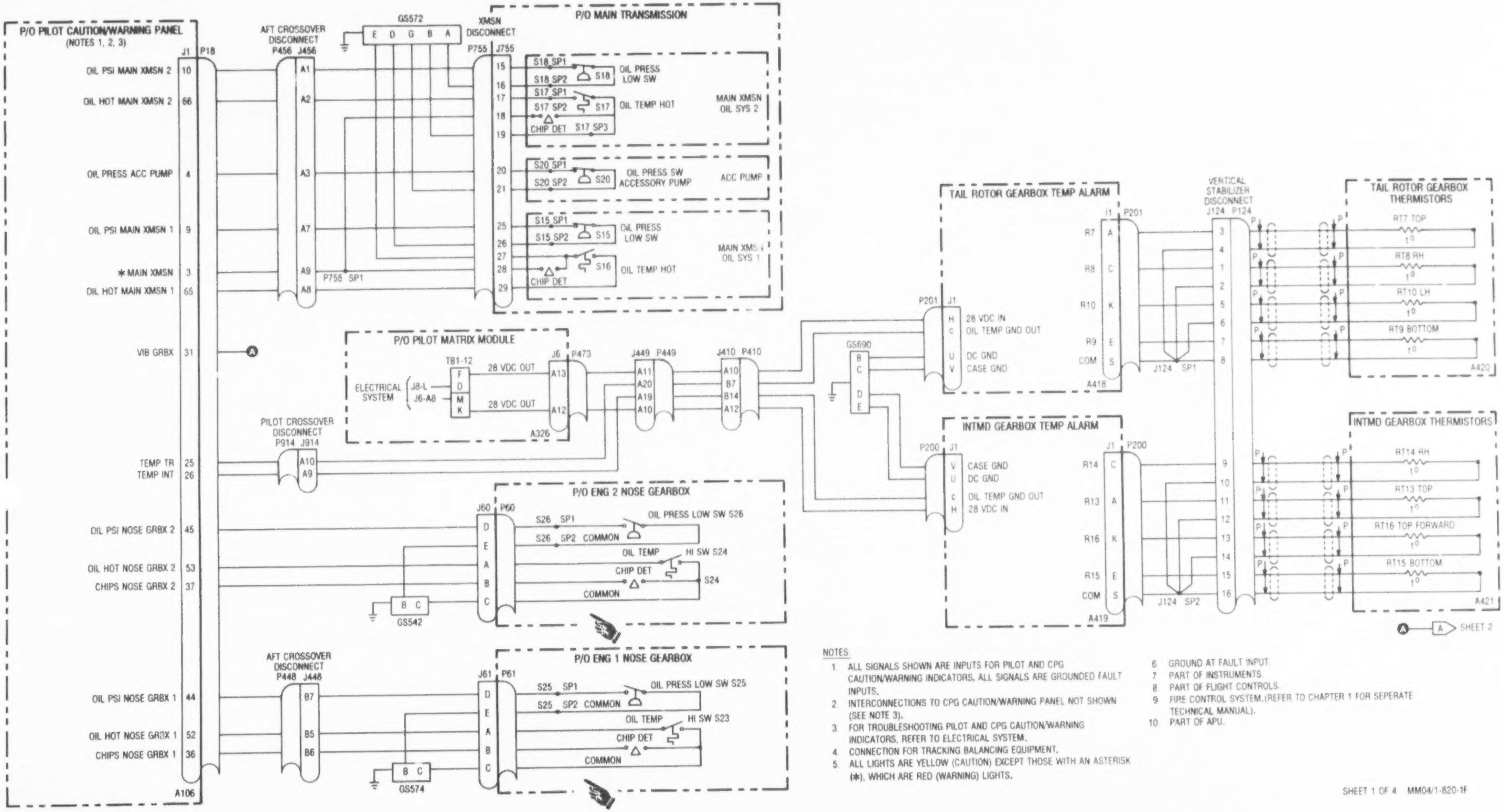
Symptom	Go to Para
1. HOD **NGB1** reading - displays **28LB** or less oil pressure.	6-4-1
2. HOD **NGB1** reading - displays low oil pressure.	6-4-1
3. **OIL PSI NOSE GRBX 1** indicator - is lighted when HOD displays normal **NGB1** oil pressure.	6-4-1
4. **OIL PSI NOSE GRBX 1** indicator - is lighted when HOD displays low **NGB1** oil pressure.	6-4-1
5. HOD **XMN1** reading - displays **29LB** or less oil pressure.	6-4-1

6-1-1. DRIVE SYSTEM - FAILURE SYMPTOM LIST (cont)

Symptom	Go to Para
D. Drive System - Dynamic Operational Check (cont):	
6. HOD **XMN1** reading - displays low oil pressure.	6-4-1
7. **OIL PSI MAIN XMSN 1** indicator - is lighted when HOD displays normal **XMN1** oil pressure.	6-4-1
8. **OIL PSI MAIN XMSN 1** indicator - is lighted when HOD displays low **XMSN 1** oil pressure.	6-4-1
9. HOD **XMN2** reading - displays **28LB** or less oil pressure.	6-4-1
10. HOD **XMN2** reading - displays low oil pressure.	6-4-1
11. **OIL PSI MAIN XMSN 2** indicator - is lighted when HOD displays normal **XMN2** oil pressure.	6-4-1
12. **OIL PSI MAIN XMSN 2** indicator - is lighted when HOD displays low **XMN2** oil pressure.	6-4-1
13. HOD **NGB2** reading - displays **28LB** or less oil pressure.	6-4-1
14. HOD **NGB2** reading - displays low oil pressure.	6-4-1
15. **OIL PSI NOSE GRBX 2** indicator - is lighted when HOD displays normal **NGB2** reading.	6-4-1
16. **OIL PSI NOSE GRBX 2** indicator - is lighted when HOD displays low **NGB2** oil pressure.	6-4-1
17. HOD **NGB1** reading - displays **140** degrees **C** or higher oil temperature.	6-4-1
18. HOD **NGB1** reading - displays high oil temperature.	6-4-1
19. **OIL HOT NOSE GRBX 1** indicator - is lighted when HOD displays normal **NGB1** oil temperature.	6-4-1
20. **OIL HOT NOSE GRBX 1** indicator - is lighted when HOD displays high **NGB1** oil temperature.	6-4-1
21. HOD **XMN1** reading - displays **140** degrees **C** or higher oil temperature.	6-4-1
22. HOD **XMN1** reading - displays high oil temperature.	6-4-1
23. **OIL HOT MAIN XMSN 1** indicator - is lighted when HOD displays normal **XMN1** oil temperature.	6-4-1

Symptom	Go to Para
24. **OIL HOT MAIN XMSN 1** indicator - is lighted when HOD displays high **XMN1** oil temperature.	6-4-1
25. HOD **XMN2** reading - displays **140** degrees **C** or higher oil temperature.	6-4-1
26. HOD **XMN2** reading - displays high oil temperature.	6-4-1
27. **OIL HOT MAIN XMSN 2** indicator - is lighted when HOD displays normal **XMN2** oil temperature.	6-4-1
28. **OIL HOT MAIN XMSN 2** indicator - is lighted when HOD displays high **XMN2** oil temperature.	6-4-1
29. HOD **NGB2** reading - displays **140** degrees **C** or higher oil temperature.	6-4-1
30. HOD **NGB2** reading - displays high oil temperature.	6-4-1
31. **OIL HOT NOSE GRBX 2** indicator - is lighted when HOD displays normal **NGB2** oil temperature.	6-4-1
32. **OIL HOT NOSE GRBX 2** indicator - is lighted when HOD displays high **NGB2** oil temperature.	6-4-1
33. **TEMP INT** indicator - lights.	6-4-1.
34. **TEMP TR** indicator - lights.	6-4-1
35. **CHIPS NOSE GRBX 1** indicator - lights.	6-4-1
36. **CHIPS NOSE GRBX 2** indicator - lights.	6-4-1
37. **CHIPS MAIN XMSN** indicator - lights.	6-4-1
38. Engine nose gearbox oil loss is indicated.	6-4-1

6-1-2. DRIVE SYSTEM - INTERCONNECTION DIAGRAM

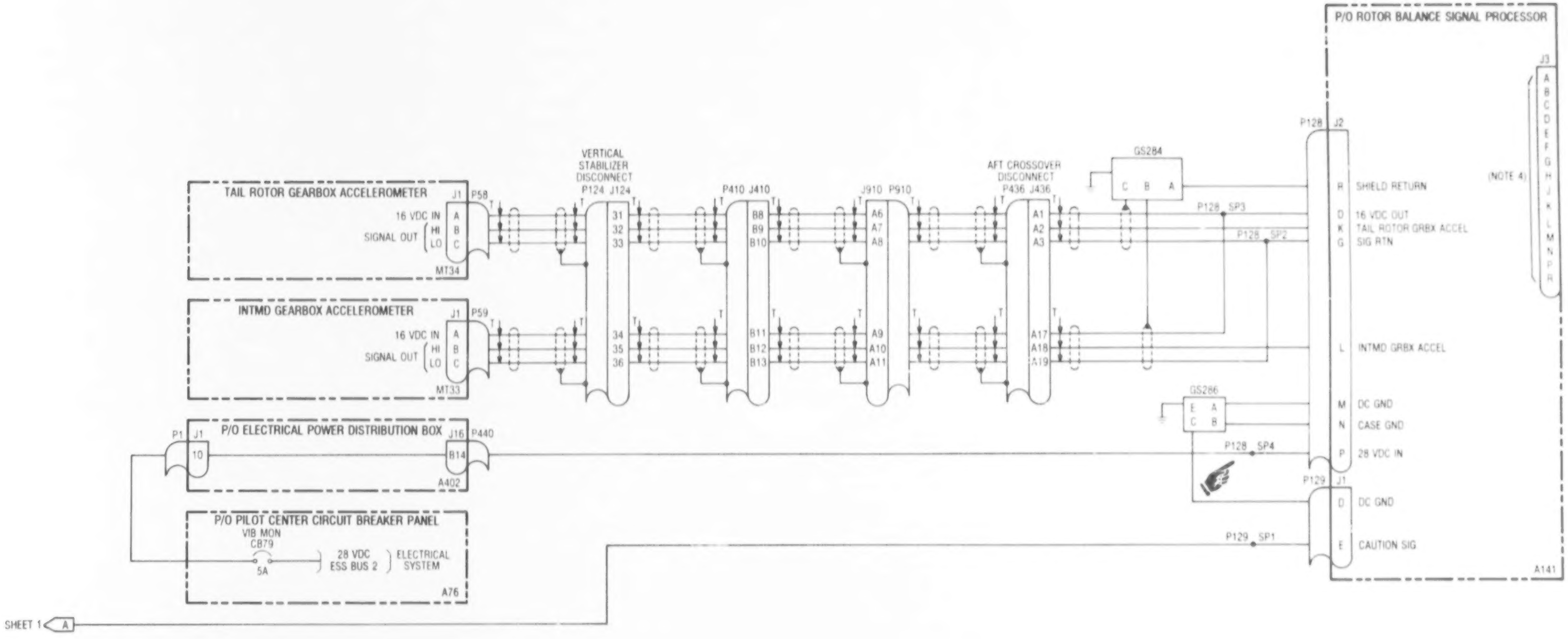

P/O PILOT CAUTION/WARNING PANEL (NOTES 1, 2, 3)
J1 P18
OIL PSI MAIN XMSN 2 10
OIL HOT MAIN XMSN 2 66
OIL PRESS ACC PUMP 4
OIL PSI MAIN XMSN 1 9
✱MAIN XMSN 3
OIL HOT MAIN XMSN 1 65
VIB GRBX 31
TEMP TR 25
TEMP INT 26
OIL PSI NOSE GRBX 2 45
OIL HOT NOSE GRBX 2 53
CHIPS NOSE GRBX 2 37
OIL PSI NOSE GRBX 1 44
OIL HOT NOSE GRBX 1 52
CHIPS NOSE GRBX 1 36
A106
AFT CROSSOVER DISCONNECT P456 J456
A1 A2 A3 A7 A9 A8
P755 SP1
GS572 E D G B A
XMSN DISCONNECT P755 J755
15 16 17 18 19 20 21 25 26 27 28 29
P/O MAIN TRANSMISSION
S18 SP1 S18 SP2 S18 OIL PRESS LOW SW
S17 SP1 S17 SP2 S17 OIL TEMP HOT
CHIP DET S17 SP3
MAIN XMSN OIL SYS 2
S20 SP1 S20 SP2 S20 OIL PRESS SW ACCESSORY PUMP
ACC PUMP
S15 SP1 S15 SP2 S15 OIL PRESS LOW SW
S16 OIL TEMP HOT
CHIP DET
MAIN XMSN OIL SYS 1
A
P/O PILOT MATRIX MODULE
TB1-12
ELECTRICAL SYSTEM J8-L J6-A8
F D M K
28 VDC OUT
28 VDC OUT
J6 P473 A13 A12
A326
J449 P449 A11 A20 A19 A10
J410 P410 A10 B7 B14 A12
PILOT CROSSOVER DISCONNECT P914 J914 A10 A9
GS690 B C D E
P/O ENG 2 NOSE GEARBOX
J60 P60 D E A B C
S26 SP1 OIL PRESS LOW SW S26
S26 SP2 COMMON
OIL TEMP HI SW S24
CHIP DET S24
COMMON
B C GS542
AFT CROSSOVER DISCONNECT P448 J448 B7 B5 B6
P/O ENG 1 NOSE GEARBOX
J61 P61 D E A B C
S25 SP1 OIL PRESS LOW SW S25
S25 SP2 COMMON
OIL TEMP HI SW S23
CHIP DET
COMMON
B C GS574
TAIL ROTOR GEARBOX TEMP ALARM
P201 J1
H C U V
28 VDC IN
OIL TEMP GND OUT
DC GND
CASE GND
J1 P201
R7 A R8 C R10 K R9 E COM S
A418
INTMD GEARBOX TEMP ALARM
P200 J1
V U C H
CASE GND
DC GND
OIL TEMP GND OUT
28 VDC IN
J1 P200
R14 C R13 A R16 K R15 E COM S
A419
VERTICAL STABILIZER DISCONNECT J124 P124
3 4 1 2 5 6 7 8 9 10 11 12 13 14 15 16
J124 SP1
J124 SP2
P
TAIL ROTOR GEARBOX THERMISTORS
RT7 TOP
RT8 RH
RT10 LH
RT9 BOTTOM
t°
A420
INTMD GEARBOX THERMISTORS
RT14 RH
RT13 TOP
RT16 TOP FORWARD
RT15 BOTTOM
A421
A — A SHEET 2

NOTES

1. ALL SIGNALS SHOWN ARE INPUTS FOR PILOT AND CPG CAUTION/WARNING INDICATORS. ALL SIGNALS ARE GROUNDED FAULT INPUTS.
2. INTERCONNECTIONS TO CPG CAUTION/WARNING PANEL NOT SHOWN (SEE NOTE 3).
3. FOR TROUBLESHOOTING PILOT AND CPG CAUTION/WARNING INDICATORS, REFER TO ELECTRICAL SYSTEM.
4. CONNECTION FOR TRACKING BALANCING EQUIPMENT.
5. ALL LIGHTS ARE YELLOW (CAUTION) EXCEPT THOSE WITH AN ASTERISK (✱), WHICH ARE RED (WARNING) LIGHTS.
6. GROUND AT FAULT INPUT.
7. PART OF INSTRUMENTS.
8. PART OF FLIGHT CONTROLS.
9. FIRE CONTROL SYSTEM.(REFER TO CHAPTER 1 FOR SEPERATE TECHNICAL MANUAL).
10. PART OF APU.

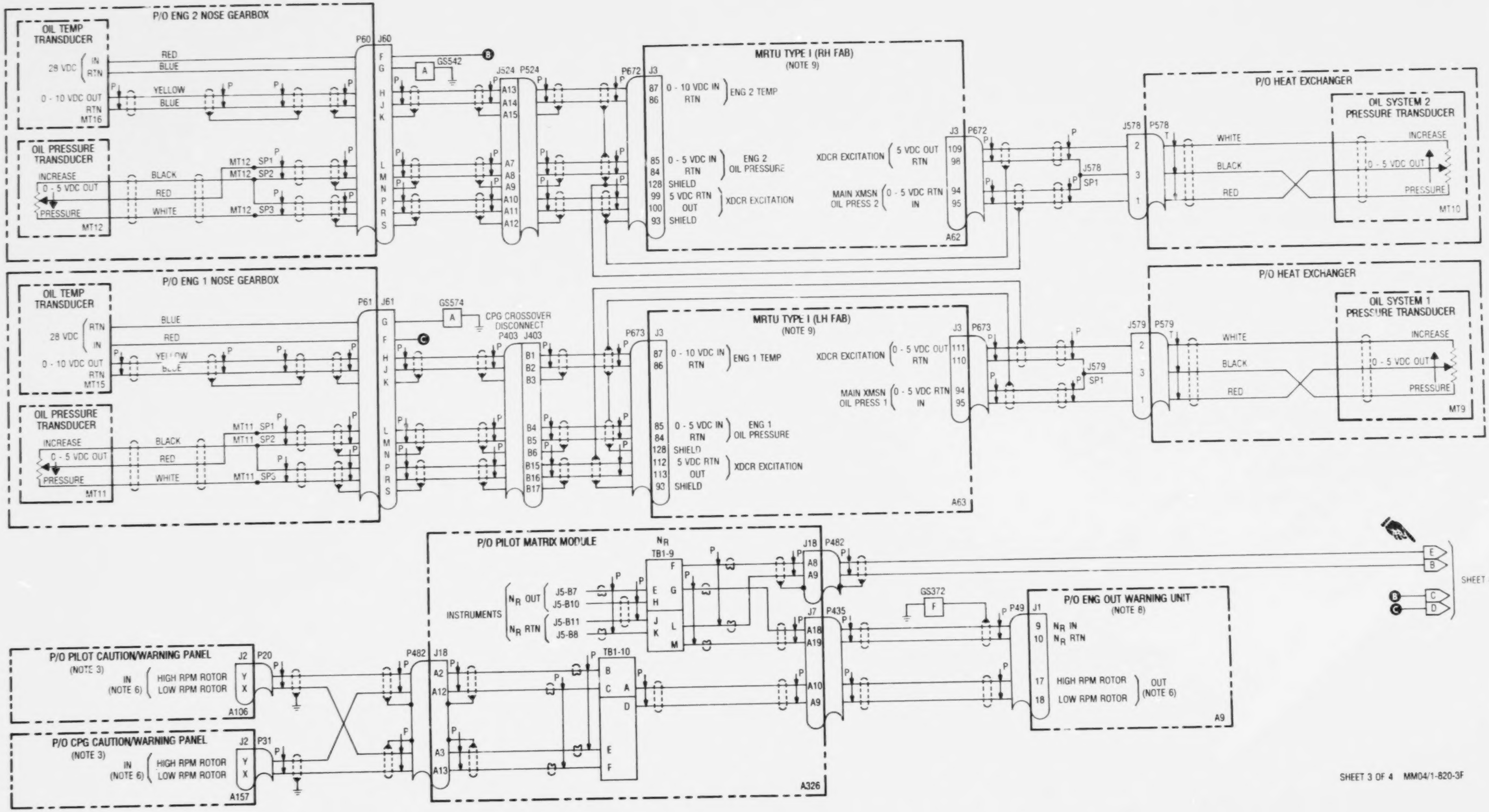
SHEET 1 OF 4 MM04/1-820-1F

6-1-2. DRIVE SYSTEM - INTERCONNECTION DIAGRAM (cont)


TAIL ROTOR GEARBOX ACCELEROMETER
J1
P58
16 VDC IN
SIGNAL OUT
HI
LO
A
B
C
MT34
INTMD GEARBOX ACCELEROMETER
J1
P59
16 VDC IN
SIGNAL OUT
HI
LO
A
B
C
MT33
P/O ELECTRICAL POWER DISTRIBUTION BOX
P1
J1
10
J16
P440
B14
A402
P/O PILOT CENTER CIRCUIT BREAKER PANEL
VIB MON
CB79
5A
28 VDC
ESS BUS 2
ELECTRICAL
SYSTEM
A76
VERTICAL
STABILIZER
DISCONNECT
P124 J124
31
32
33
34
35
36
P410 J410
B8
B9
B10
B11
B12
B13
J910 P910
A6
A7
A8
A9
A10
A11
AFT CROSSOVER
DISCONNECT
P436 J436
A1
A2
A3
A17
A18
A19
T
GS284
C B A
P128 SP3
P128 SP2
GS286
E A
C B
P128 SP4
P129 SP1
P/O ROTOR BALANCE SIGNAL PROCESSOR
P128
J2
R SHIELD RETURN
D 16 VDC OUT
K TAIL ROTOR GRBX ACCEL
G SIG RTN
L INTMD GRBX ACCEL
M DC GND
N CASE GND
P 28 VDC IN
P129
J1
D DC GND
E CAUTION SIG
J3
A B C D E F G H J K L M N P R
(NOTE 4)
A141
SHEET 1
A

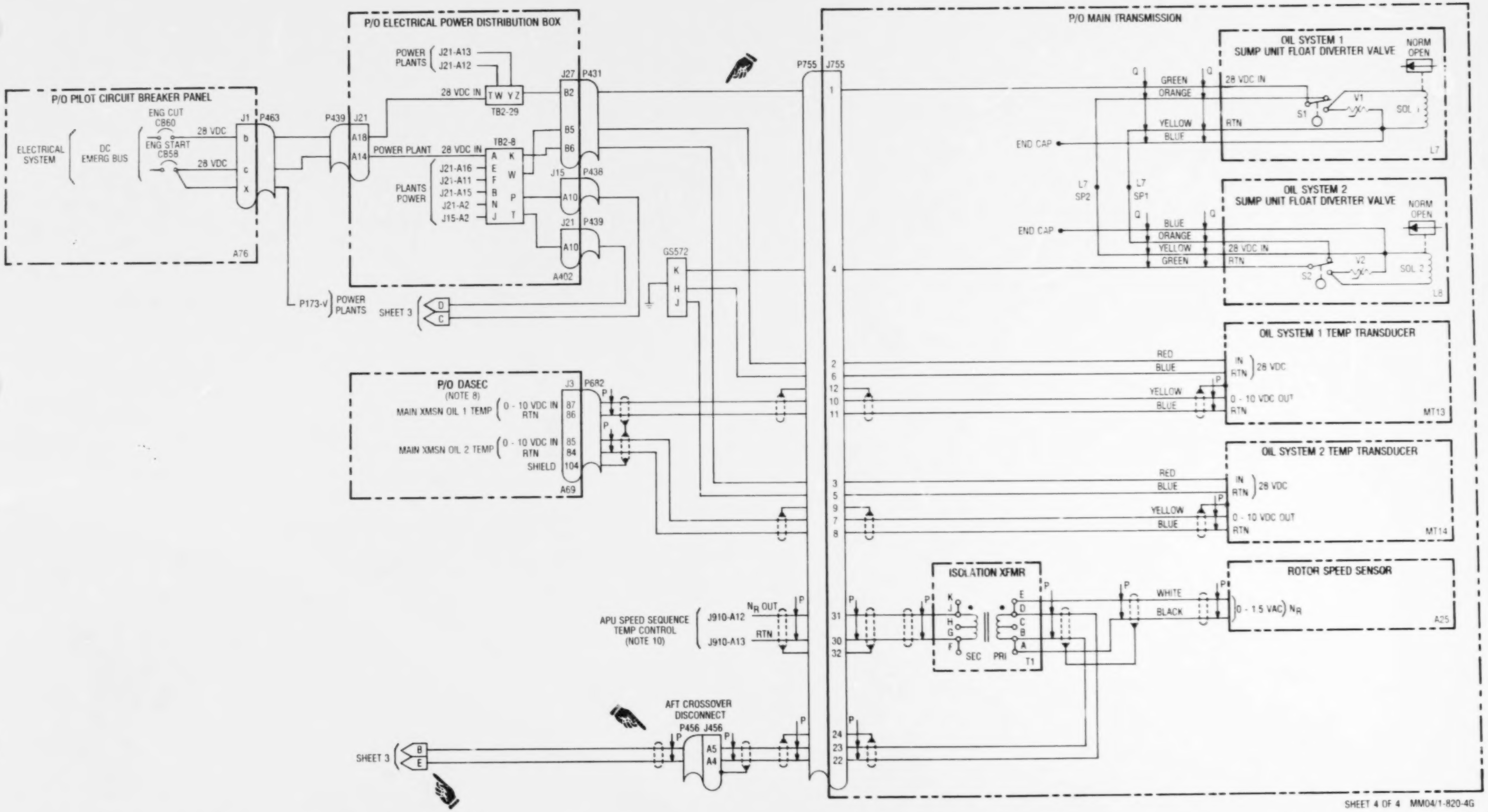
SHEET 2 OF 4 MM04/1-820-2D

6-1-2. DRIVE SYSTEM - INTERCONNECTION DIAGRAM (cont)


P/O ENG 2 NOSE GEARBOX
OIL TEMP TRANSDUCER
28 VDC IN RTN
0 - 10 VDC OUT RTN
MT16
RED
BLUE
YELLOW
BLUE
OIL PRESSURE TRANSDUCER
INCREASE
0 - 5 VDC OUT
PRESSURE
MT12
BLACK
RED
WHITE
MT12 SP1
MT12 SP2
MT12 SP3
P60
J60
GS542
A
J524
P524
P672
J3
MRTU TYPE I (RH FAB)
(NOTE 9)
0 - 10 VDC IN RTN
ENG 2 TEMP
0 - 5 VDC IN RTN
ENG 2 OIL PRESSURE
SHIELD
5 VDC RTN OUT
SHIELD
XDCR EXCITATION
XDCR EXCITATION 5 VDC OUT RTN
MAIN XMSN OIL PRESS 2
0 - 5 VDC RTN IN
A62
P/O HEAT EXCHANGER
OIL SYSTEM 2 PRESSURE TRANSDUCER
INCREASE
0 - 5 VDC OUT
PRESSURE
MT10
J578
P578
J578 SP1
WHITE
BLACK
RED
P/O ENG 1 NOSE GEARBOX
OIL TEMP TRANSDUCER
28 VDC RTN IN
0 - 10 VDC OUT RTN
MT15
BLUE
RED
YELLOW
BLUE
OIL PRESSURE TRANSDUCER
INCREASE
0 - 5 VDC OUT
PRESSURE
MT11
BLACK
RED
WHITE
MT11 SP1
MT11 SP2
MT11 SP3
P61
J61
GS574
A
CPG CROSSOVER DISCONNECT
P403
J403
P673
J3
MRTU TYPE I (LH FAB)
(NOTE 9)
0 - 10 VDC IN RTN
ENG 1 TEMP
0 - 5 VDC IN RTN
ENG 1 OIL PRESSURE
SHIELD
5 VDC RTN OUT
SHIELD
XDCR EXCITATION
XDCR EXCITATION 0 - 5 VDC OUT RTN
MAIN XMSN OIL PRESS 1
0 - 5 VDC RTN IN
A63
P/O HEAT EXCHANGER
OIL SYSTEM 1 PRESSURE TRANSDUCER
INCREASE
0 - 5 VDC OUT
PRESSURE
MT9
J579
P579
J579 SP1
WHITE
BLACK
RED
P/O PILOT MATRIX MODULE
NR TB1-9
INSTRUMENTS
NR OUT J5-B7 J5-B10
NR RTN J5-B11 J5-B8
TB1-10
A326
J18
P482
J7
P435
GS372
F
P49
J1
P/O ENG OUT WARNING UNIT
(NOTE 8)
NR IN
NR RTN
HIGH RPM ROTOR
LOW RPM ROTOR
OUT (NOTE 6)
A9
P/O PILOT CAUTION/WARNING PANEL
(NOTE 3)
IN (NOTE 6)
HIGH RPM ROTOR
LOW RPM ROTOR
J2
P20
A106
P/O CPG CAUTION/WARNING PANEL
(NOTE 3)
IN (NOTE 6)
HIGH RPM ROTOR
LOW RPM ROTOR
J2
P31
A157
SHEET 4
E
B
C
D
SHEET 3 OF 4 MM04/1-820-3F

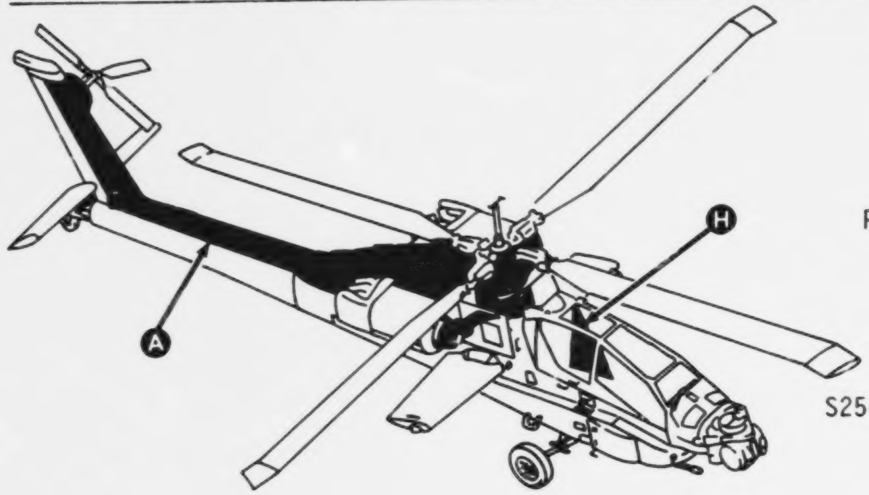
best copy available

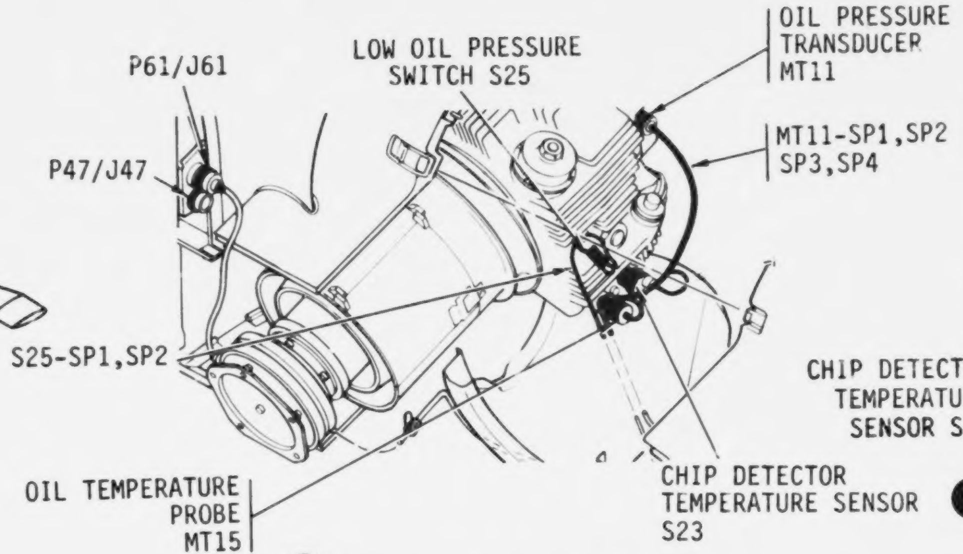
6-1-2. DRIVE SYSTEM - INTERCONNECTION DIAGRAM (cont)


P/O PILOT CIRCUIT BREAKER PANEL
ELECTRICAL SYSTEM
DC EMERG BUS
ENG CUT CB60
ENG START CB58
28 VDC
28 VDC
J1
P463
b
c
X
A76
P173-V
POWER PLANTS
P/O ELECTRICAL POWER DISTRIBUTION BOX
POWER PLANTS
J21-A13
J21-A12
28 VDC IN
T W Y Z
TB2-29
P439
J21
A18
A14
POWER PLANT
28 VDC IN
TB2-8
A K
J21-A16 E
J21-A11 F
J21-A15 B
J21-A2 N
J15-A2 J
W
P
T
PLANTS POWER
J27
P431
B2
B5
B6
J15
P438
A10
J21
P439
A10
A402
SHEET 3
D
C
GS572
K
H
J
P/O DASEC
(NOTE 8)
MAIN XMSN OIL 1 TEMP
0 - 10 VDC IN
RTN
MAIN XMSN OIL 2 TEMP
0 - 10 VDC IN
RTN
SHIELD
J3
P682
87
86
85
84
104
A69
P
APU SPEED SEQUENCE TEMP CONTROL (NOTE 10)
J910-A12
J910-A13
N_R OUT
RTN
AFT CROSSOVER DISCONNECT
P456 J456
A5
A4
SHEET 3
B
E
P755
J755
1
4
2
6
12
10
11
3
5
9
7
8
31
30
32
24
23
22
P/O MAIN TRANSMISSION
OIL SYSTEM 1 SUMP UNIT FLOAT DIVERTER VALVE
NORM OPEN
Q
GREEN
ORANGE
YELLOW
BLUE
28 VDC IN
RTN
S1
V1
SOL 1
L7
END CAP
L7 SP2
L7 SP1
OIL SYSTEM 2 SUMP UNIT FLOAT DIVERTER VALVE
NORM OPEN
END CAP
BLUE
ORANGE
YELLOW
GREEN
28 VDC IN
RTN
S2
V2
SOL 2
L8
OIL SYSTEM 1 TEMP TRANSDUCER
RED
BLUE
YELLOW
BLUE
IN
RTN
28 VDC
0 - 10 VDC OUT
RTN
MT13
OIL SYSTEM 2 TEMP TRANSDUCER
RED
BLUE
YELLOW
BLUE
IN
RTN
28 VDC
0 - 10 VDC OUT
RTN
MT14
ISOLATION XFMR
K
J
H
G
F
SEC
PRI
E
D
C
B
A
T1
ROTOR SPEED SENSOR
WHITE
BLACK
0 - 1.5 VAC
N_R
A25

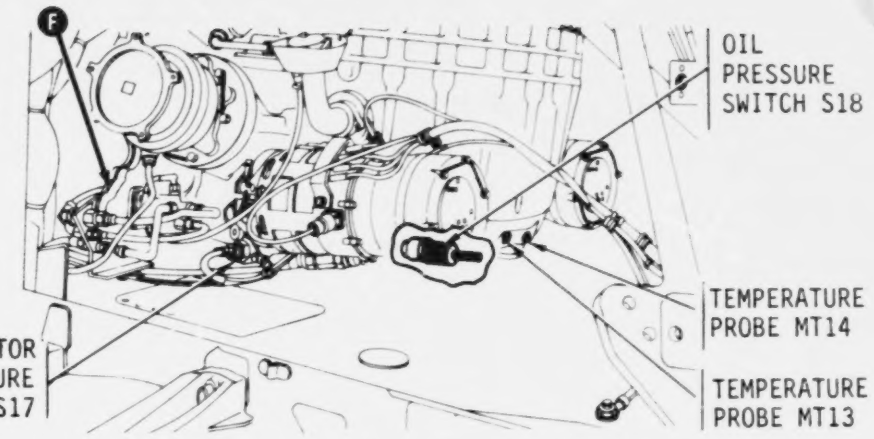
SHEET 4 OF 4 MM04/1-820-4G

6-1-3. DRIVE SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION

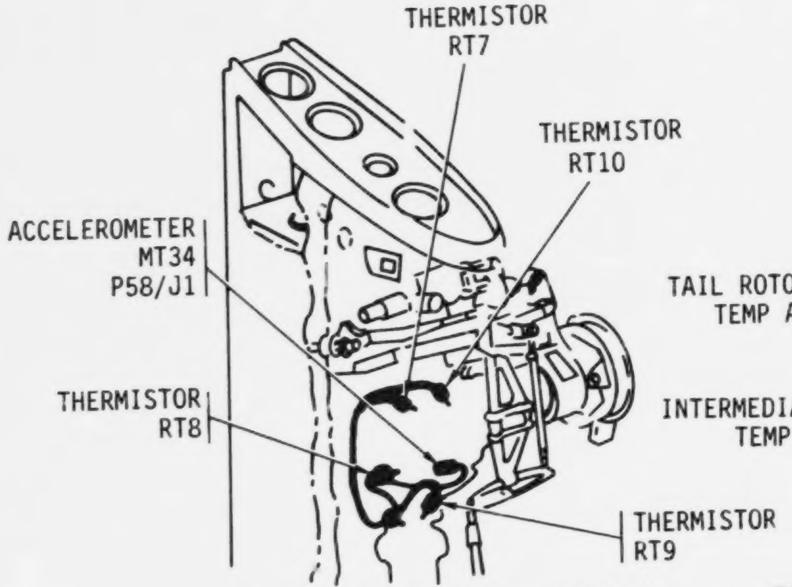



P61/J61
LOW OIL PRESSURE SWITCH S25
OIL PRESSURE TRANSDUCER MT11
MT11-SP1,SP2 SP3,SP4
P47/J47
S25-SP1,SP2
OIL TEMPERATURE PROBE MT15
CHIP DETECTOR TEMPERATURE SENSOR S23

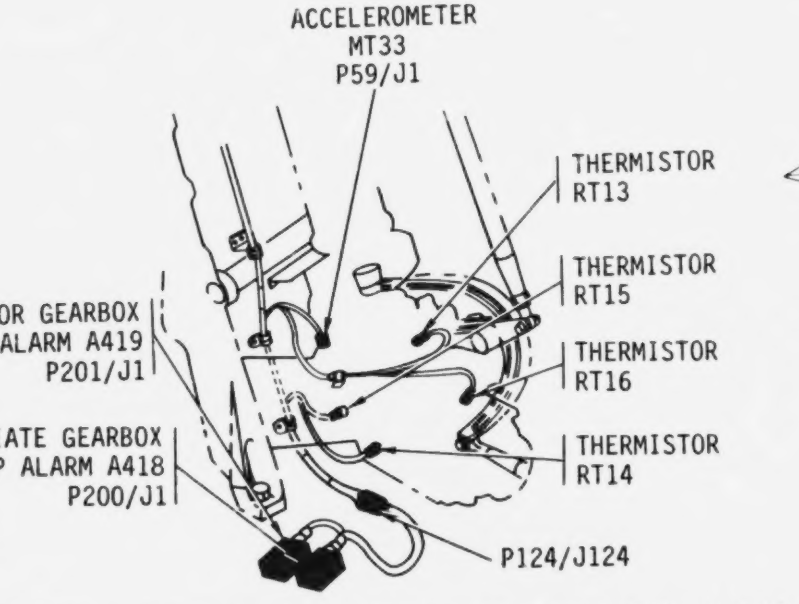
Ⓔ ENG NO.1 NOSE GEARBOX (TYPICAL)


F
OIL PRESSURE SWITCH S18
TEMPERATURE PROBE MT14
CHIP DETECTOR TEMPERATURE SENSOR S17
TEMPERATURE PROBE MT13

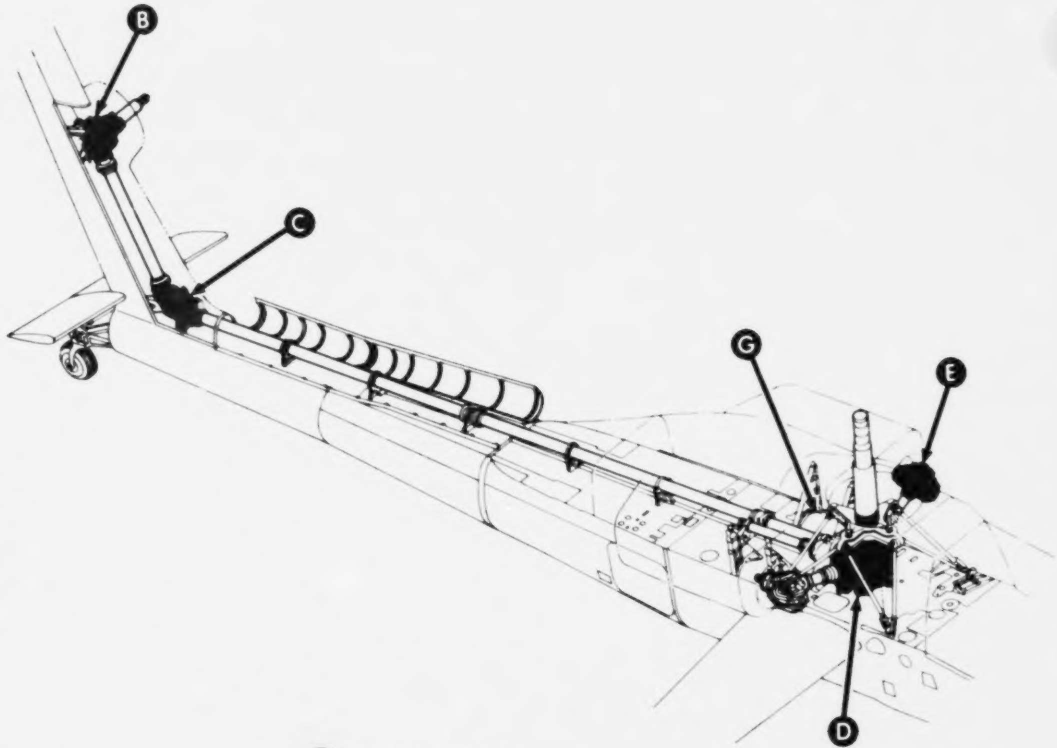
Ⓓ ACCESS TO MAIN TRANSMISSION THRU ACCESS PANEL R200


THERMISTOR RT7
THERMISTOR RT10
ACCELEROMETER MT34 P58/J1
THERMISTOR RT8
THERMISTOR RT9

Ⓑ ACCESS TO TAIL ROTOR GEARBOX THRU FAIRING L540


ACCELEROMETER MT33 P59/J1
THERMISTOR RT13
THERMISTOR RT15
TAIL ROTOR GEARBOX TEMP ALARM A419 P201/J1
THERMISTOR RT16
INTERMEDIATE GEARBOX TEMP ALARM A418 P200/J1
THERMISTOR RT14
P124/J124

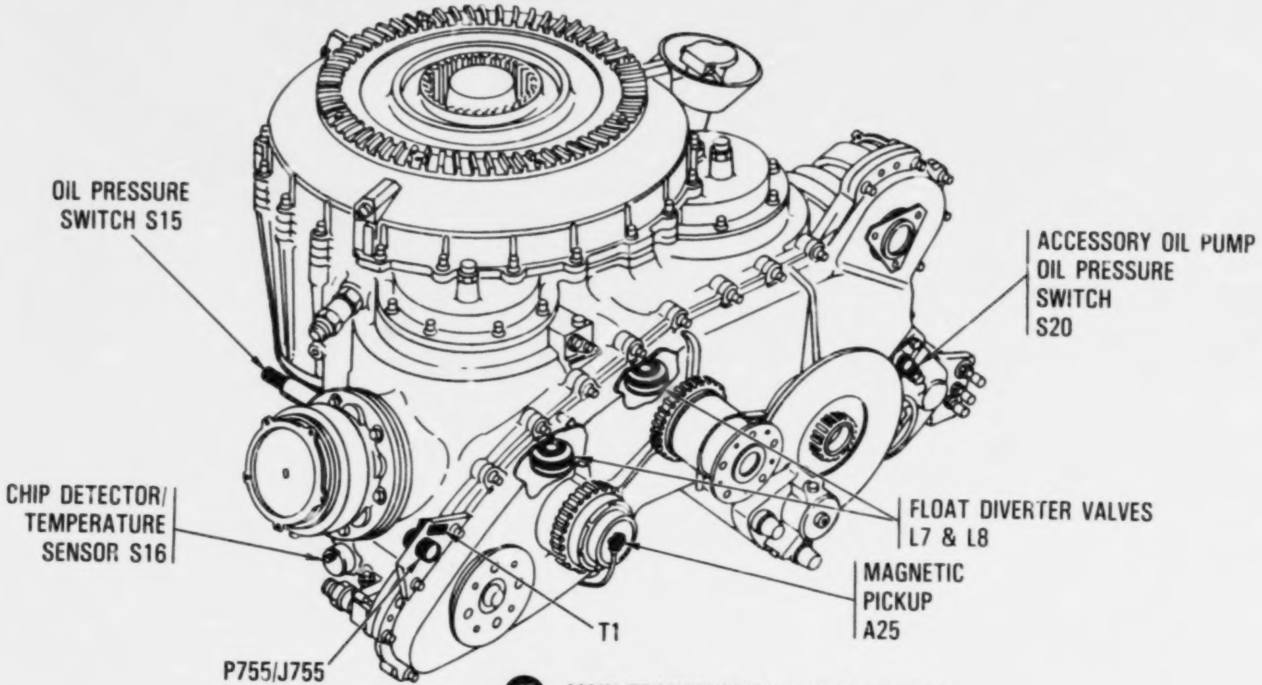
Ⓒ ACCESS TO INTERMEDIATE GEARBOX AND TEMPERATURE ALARMS THRU FAIRINGS R510/L510 AND R545/L545



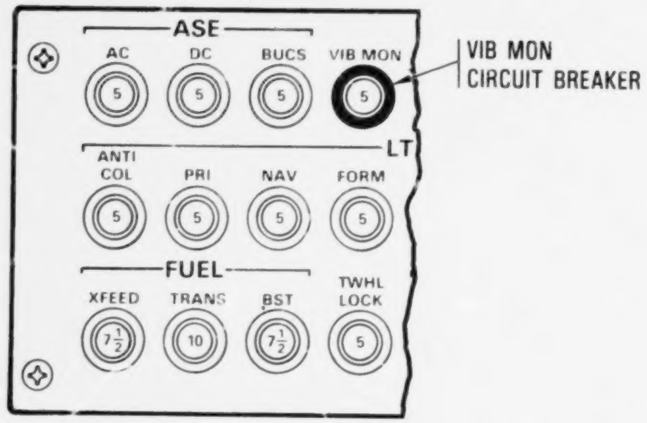
Ⓐ DRIVE SYSTEM

MM04/1-911-1 C

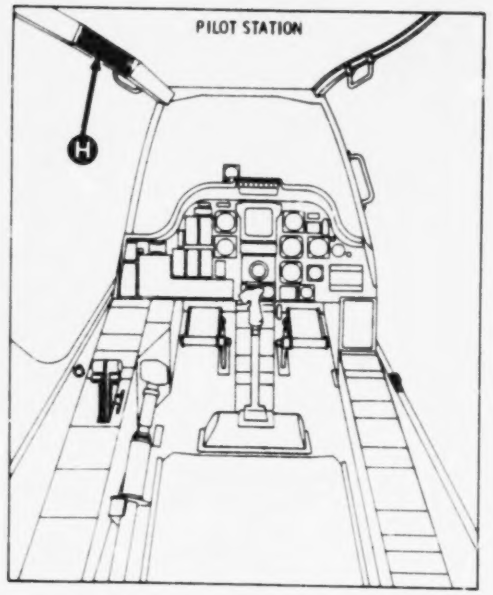
6-1-3. DRIVE SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

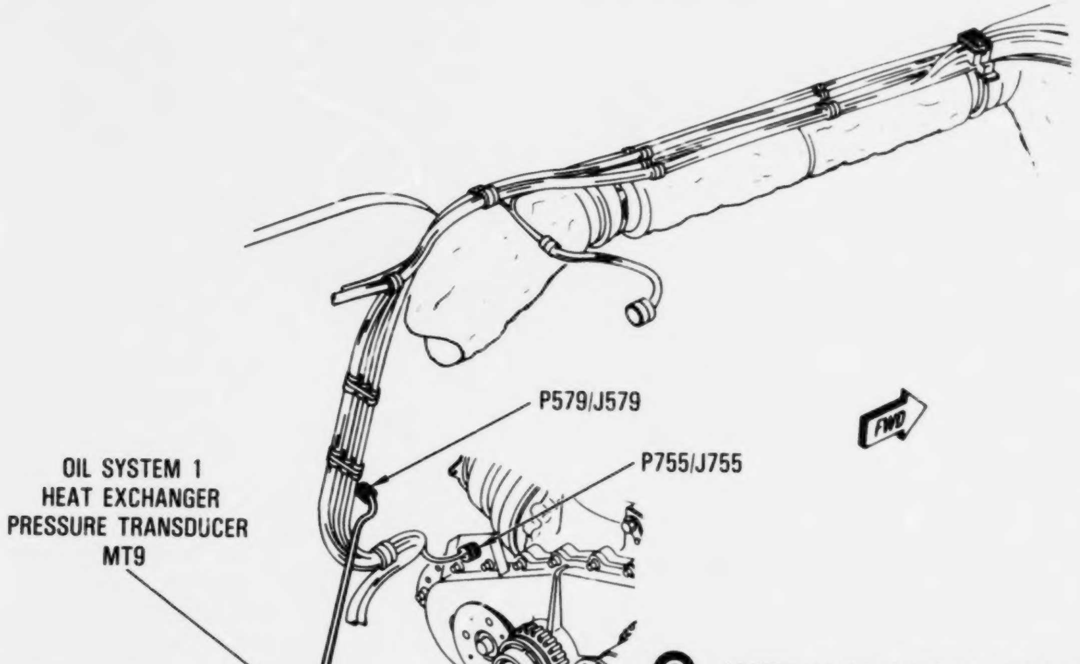

OIL PRESSURE SWITCH S15
ACCESSORY OIL PUMP OIL PRESSURE SWITCH S20
CHIP DETECTOR/ TEMPERATURE SENSOR S16
FLOAT DIVERTER VALVES L7 & L8
MAGNETIC PICKUP A25
T1
P755/J755

F MAIN TRANSMISSION-LEFT/REAR SIDE

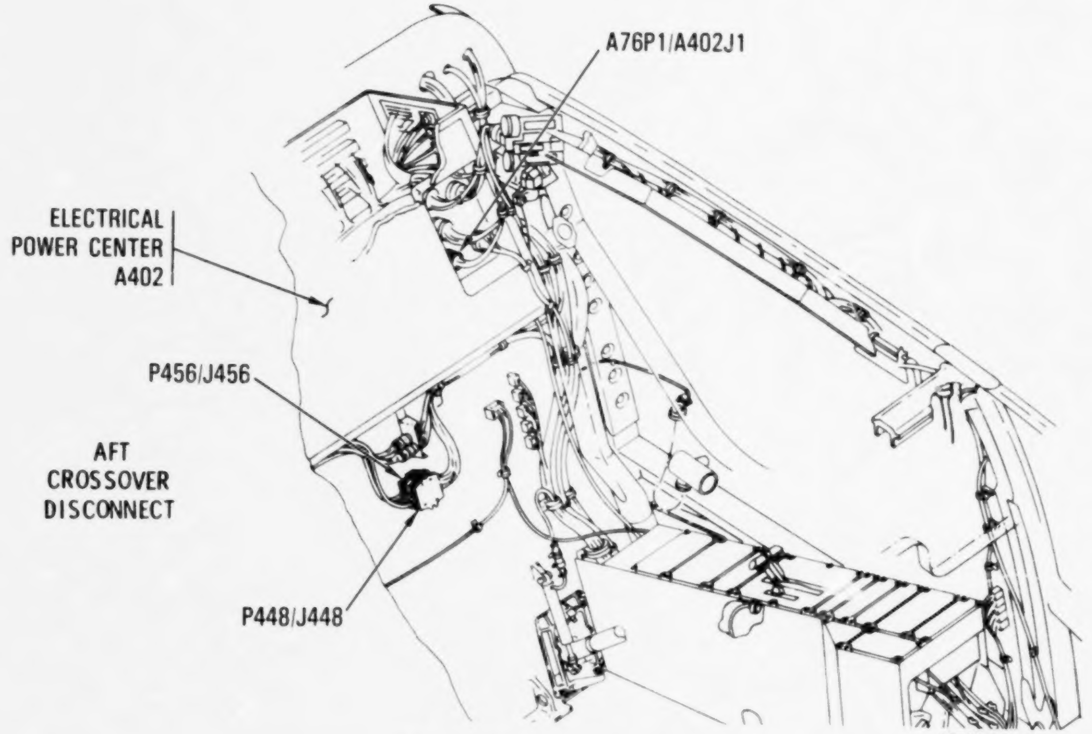

ASE
AC
DC
BUCS
VIB MON
5
5
5
5
VIB MON CIRCUIT BREAKER
LT
ANTI COL
PRI
NAV
FORM
5
5
5
5
FUEL
XFEED
TRANS
BST
TWHL LOCK
7½
10
7½
5

H PILOT CENTER CIRCUIT BREAKER PANEL


PILOT STATION
H


P579/J579
P755/J755
FWD
OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER MT9

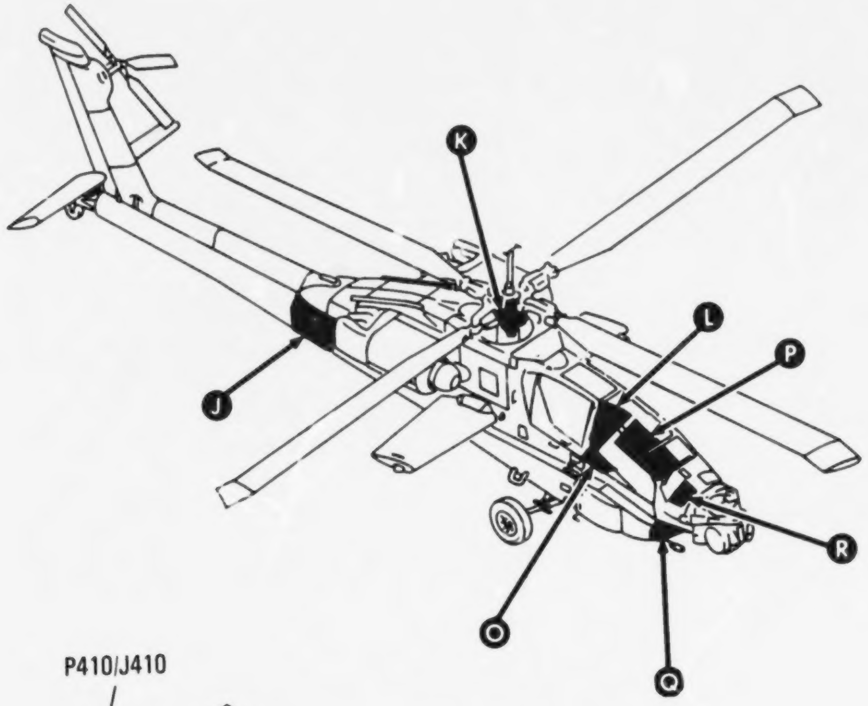
G ACCESS TO DRIVE SYSTEM ELECTRICAL CONNECTIONS THRU L325, T325, T290L, T290R, T250L AND T250R

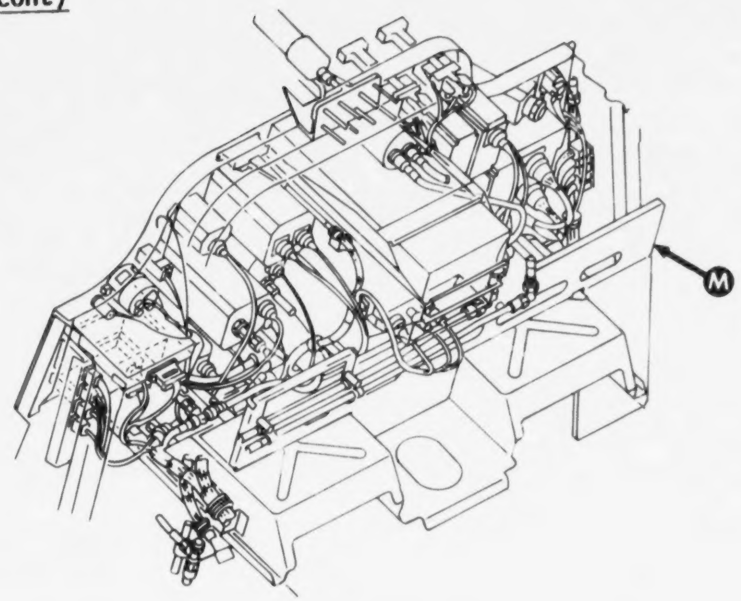

A76P1/A402J1
ELECTRICAL POWER CENTER A402
P456/J456
AFT CROSSOVER DISCONNECT
P448/J448

MM04/1-911-2

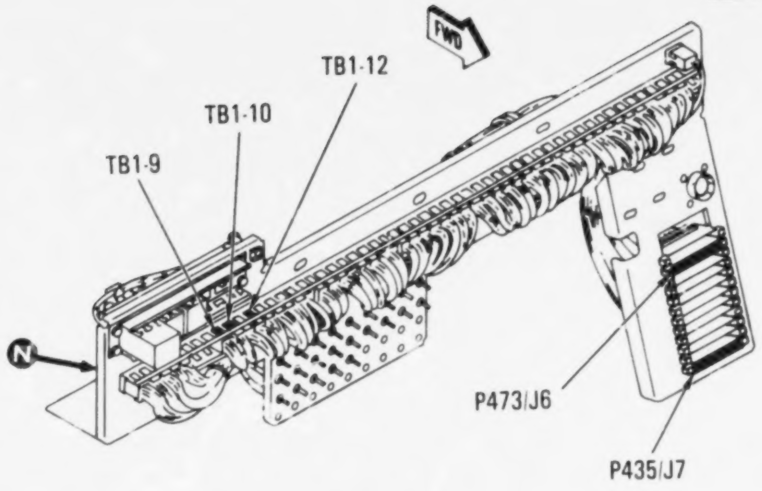
I PILOT STATION AFT CROSSOVER DISCONNECT

6-1-3. DRIVE SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

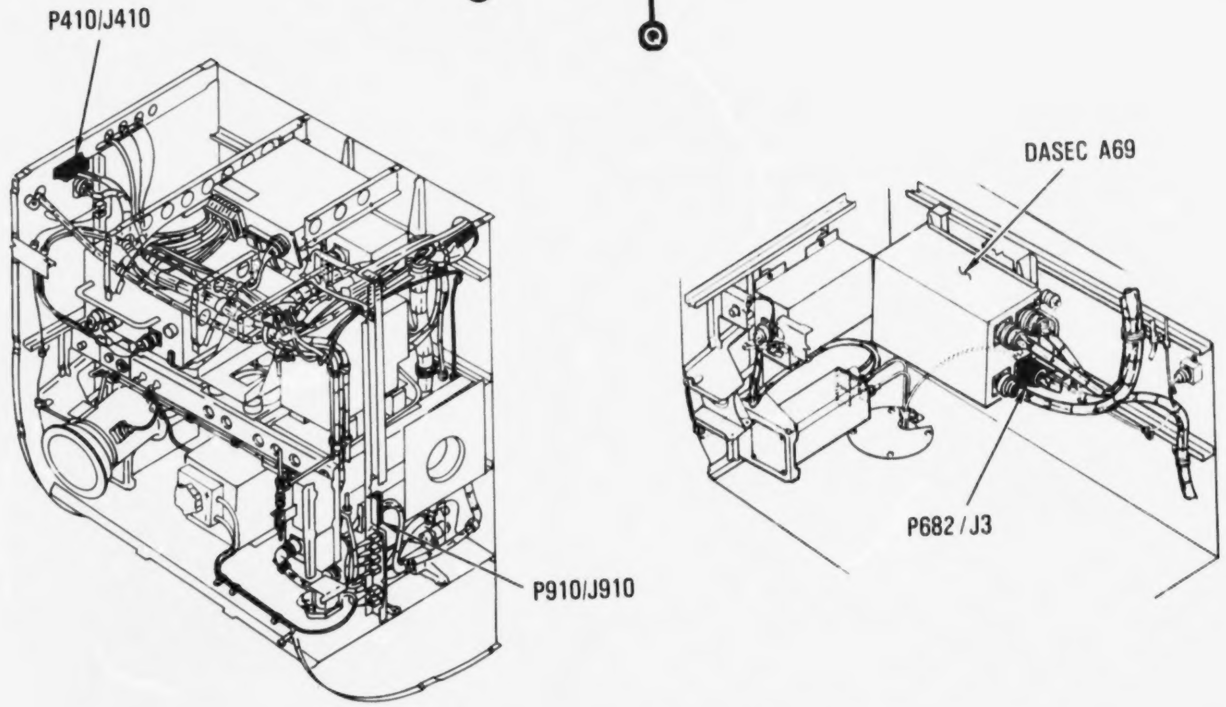




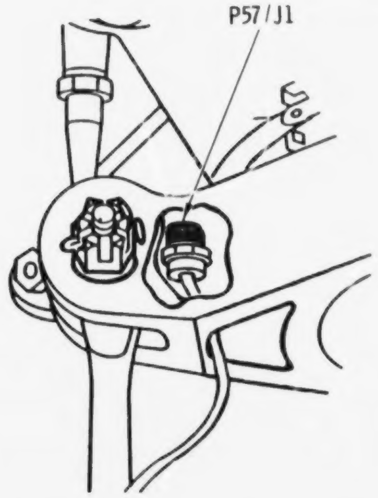
Ⓛ PILOT INSTRUMENT PANEL


FWD
TB1-12
TB1-10
TB1-9
N
P473/J6
P435/J7

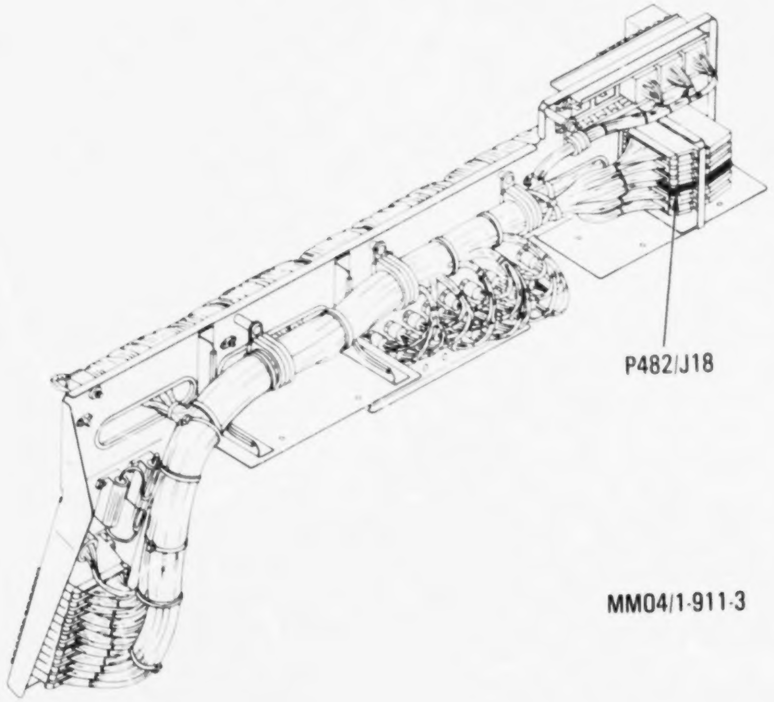
Ⓜ PILOT MATRIX MODULE


P410/J410
P910/J910
DASEC A69
P682 / J3

Ⓙ ACCESS TO DRIVE SYSTEMS CONNECTIONS IN AFT AVIONICS BAY THRU DOOR R295



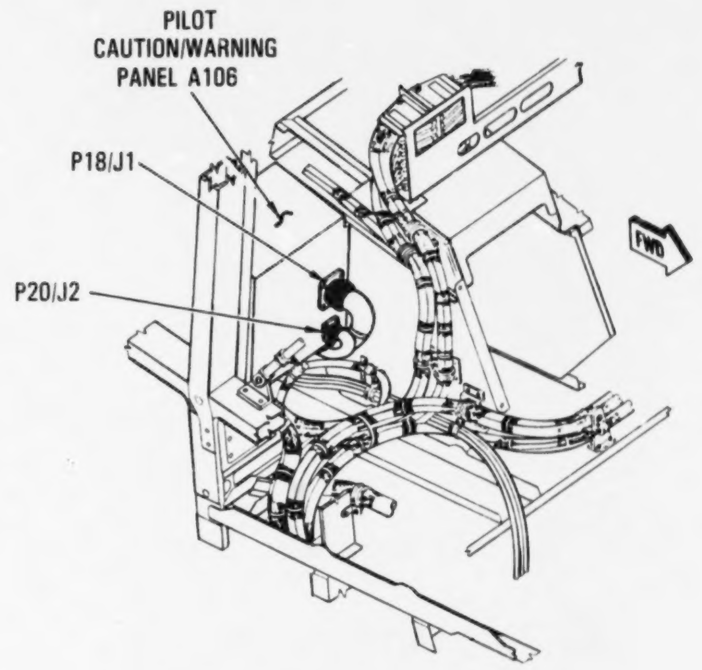
Ⓚ MAGNETIC PICKUP TRANSDUCER



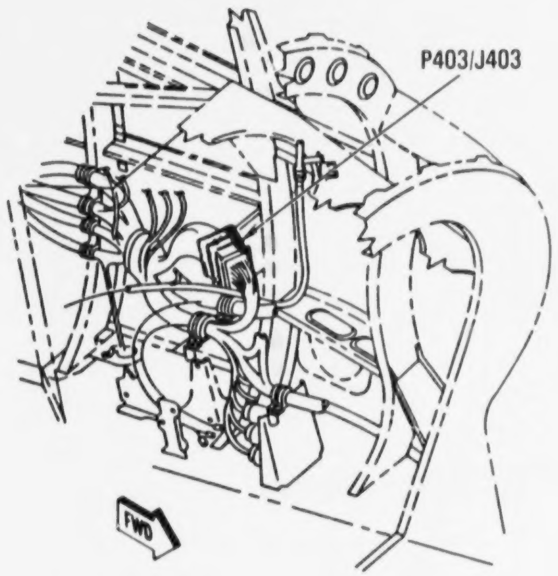
MM04/1-911-3

Ⓝ PILOT MATRIX MODULE

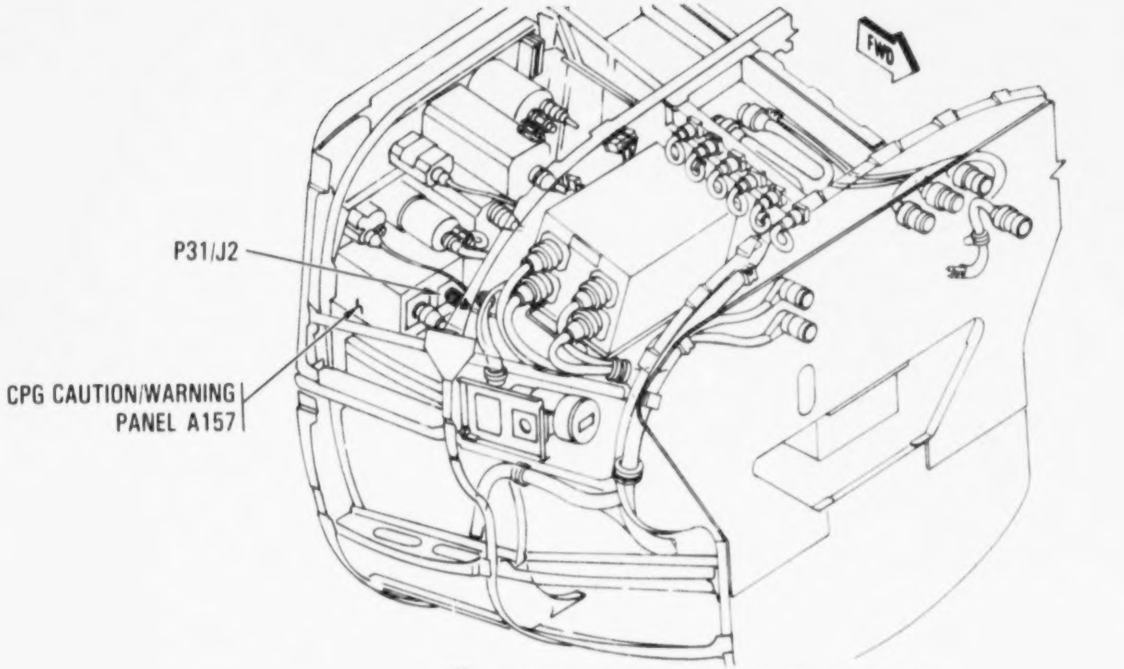
6-1-3. DRIVE SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


PILOT CAUTION/WARNING PANEL A106
P18/J1
P20/J2
FWD

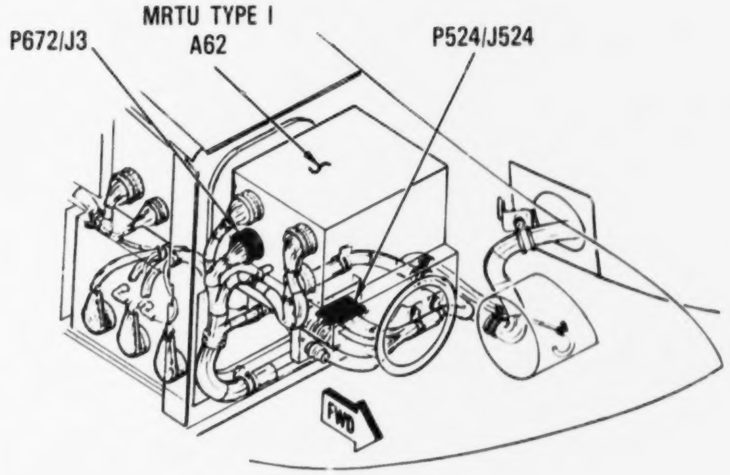
Ⓞ PILOT CAUTION/WARNING PANEL


P403/J403
FWD

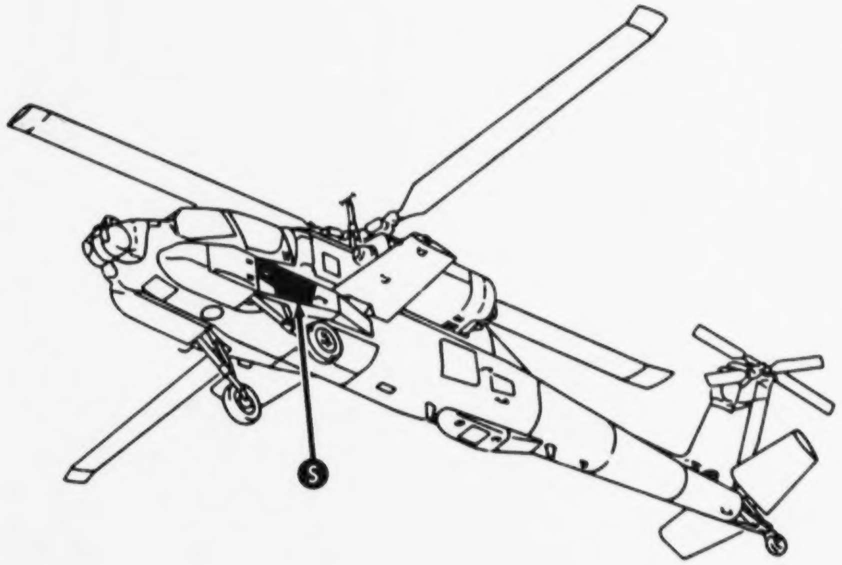
Ⓟ CPG STATION FLOOR (LEFT SIDE)

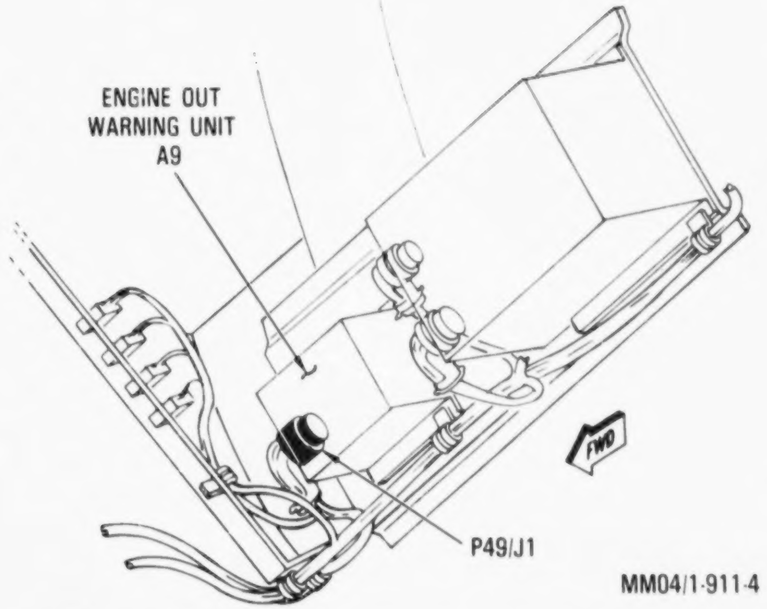

FWD
P31/J2
CPG CAUTION/WARNING PANEL A157

Ⓡ ACCESS TO CPG CAUTION/WARNING PANEL THRU COVER R40


P672/J3
MRTU TYPE I A62
P524/J524
FWD

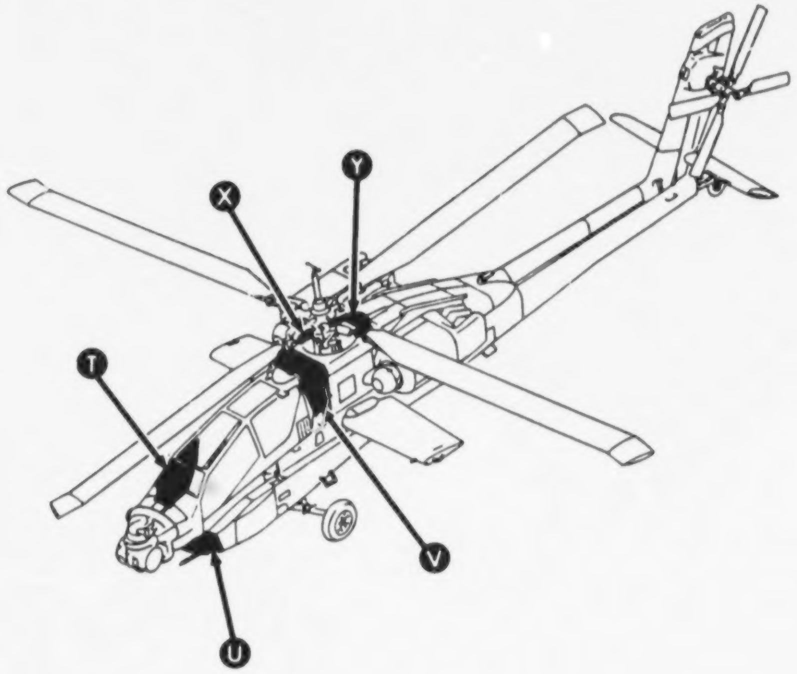
Ⓠ ACCESS TO MRTU TYPE I THRU FAIRING R60

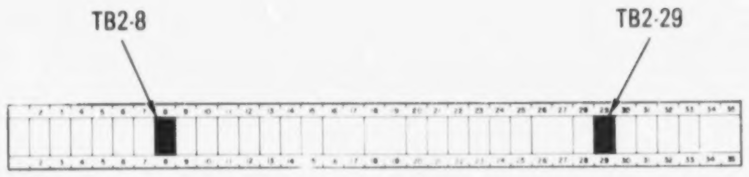



ENGINE OUT WARNING UNIT A9
FWD
P49/J1
MM04/1-911-4

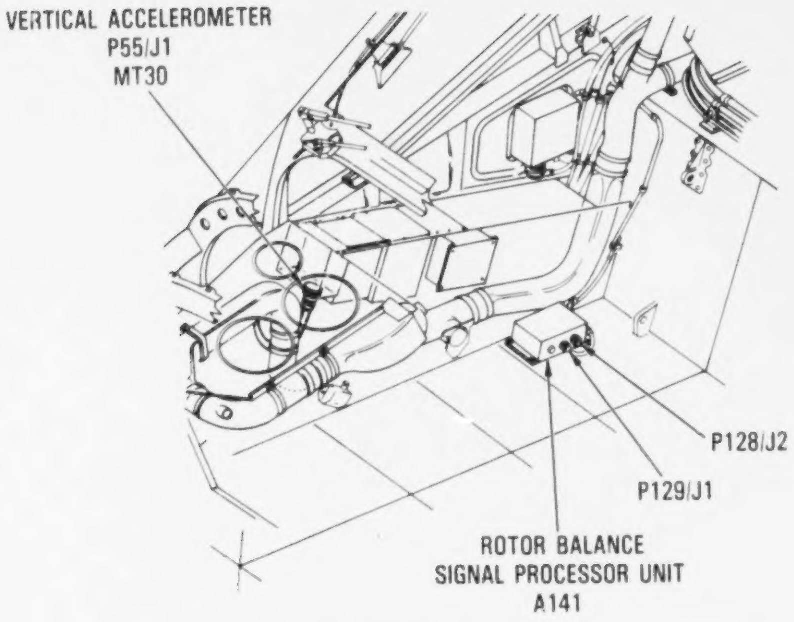
Ⓢ ACCESS TO ENGINE OUT WARNING UNIT THRU FAIRING L140

6-1-3. DRIVE SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

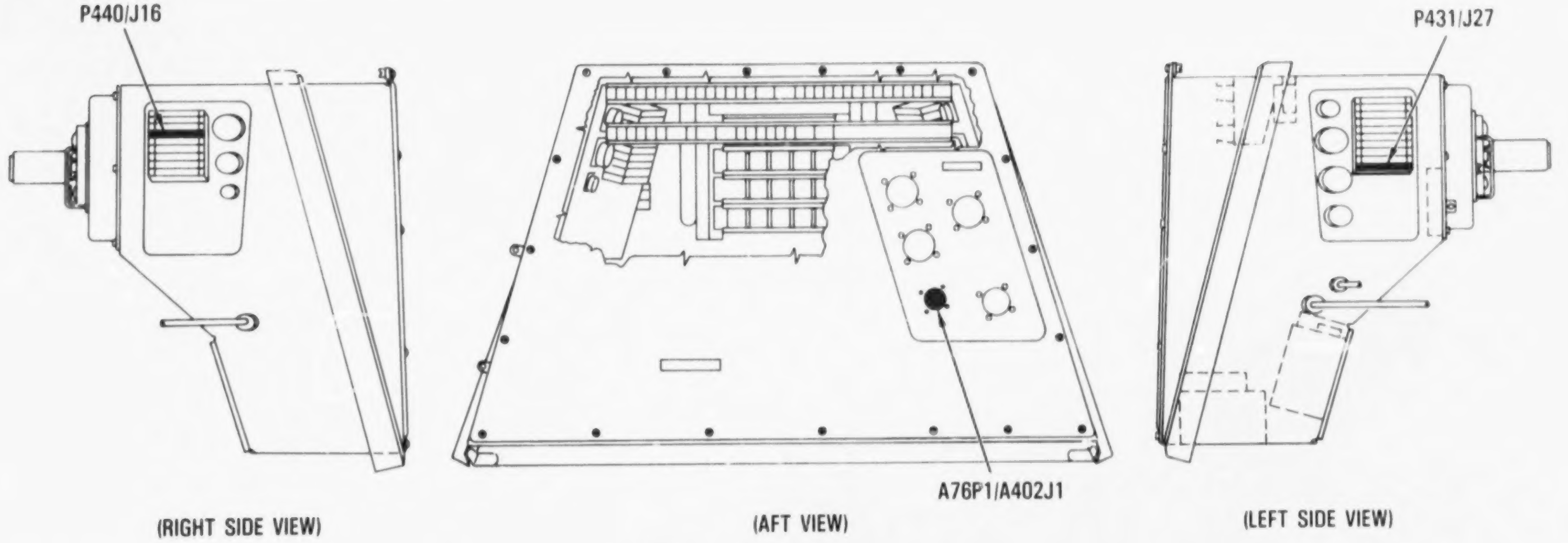




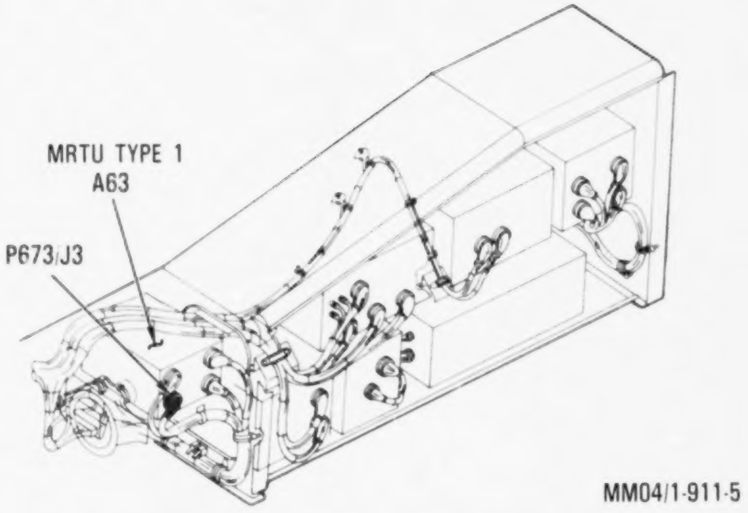
W TERMINAL BOARD TB2


VERTICAL ACCELEROMETER
P55/J1
MT30
P128/J2
P129/J1
ROTOR BALANCE
SIGNAL PROCESSOR UNIT
A141

T CPG STATION FLOOR-RIGHT SIDE


P440/J16
P431/J27
A76P1/A402J1
(RIGHT SIDE VIEW)
(AFT VIEW)
(LEFT SIDE VIEW)

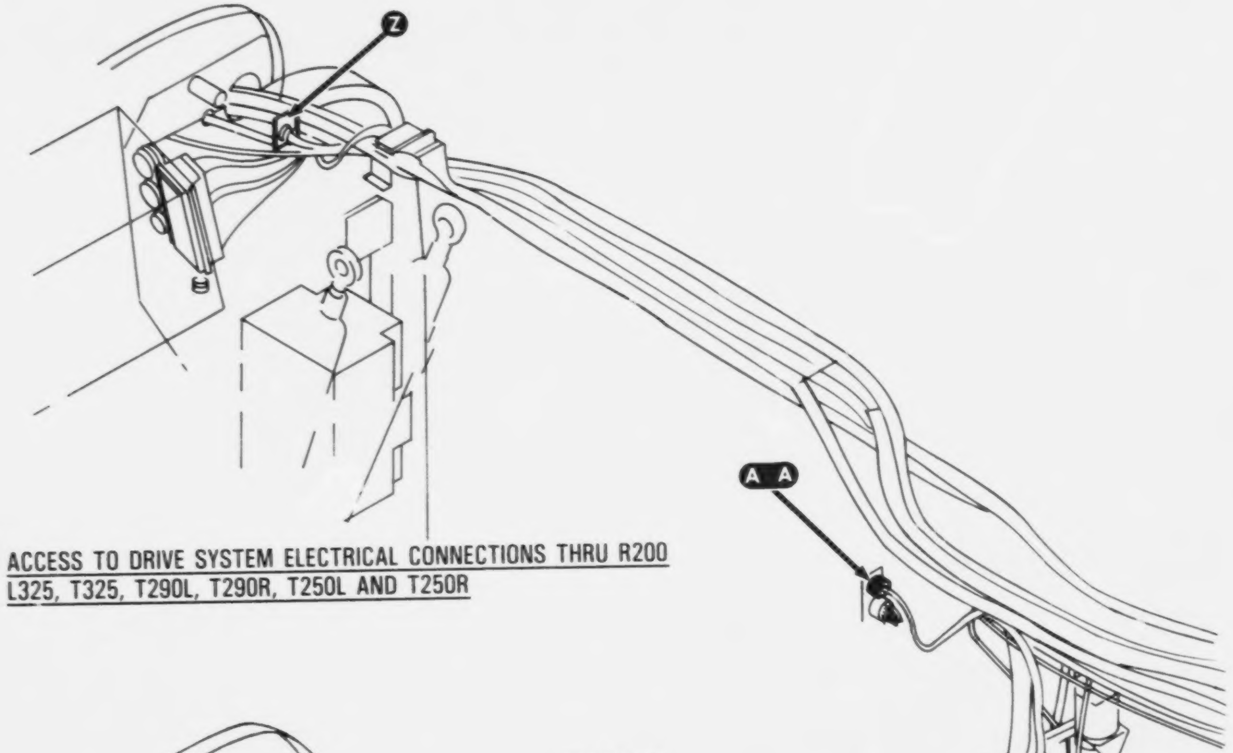
V ELECTRICAL POWER CENTER


MRTU TYPE 1
A63
P673/J3

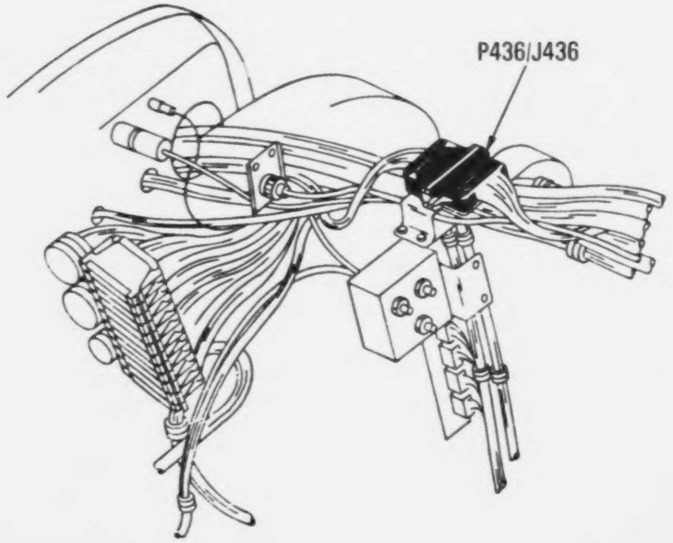
MM04/1-911-5

U ACCESS TO MRTU TYPE I THRU FAIRING L60

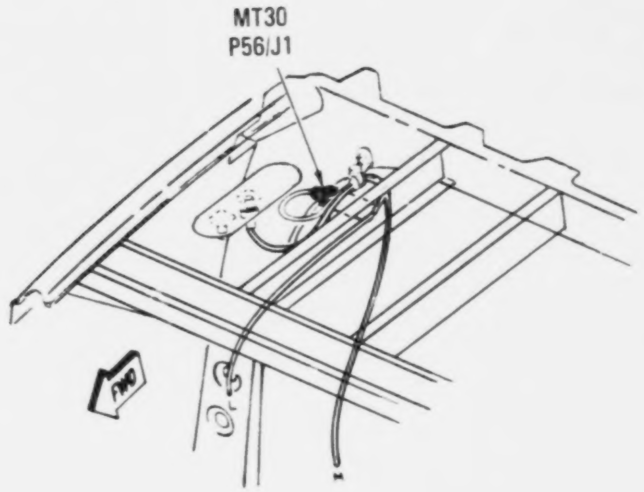
6-1-3. DRIVE SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


Z
A A
P578/J578
OIL SYSTEM 2
HEAT EXCHANGER
PRESSURE TRANSDUCER
MT10

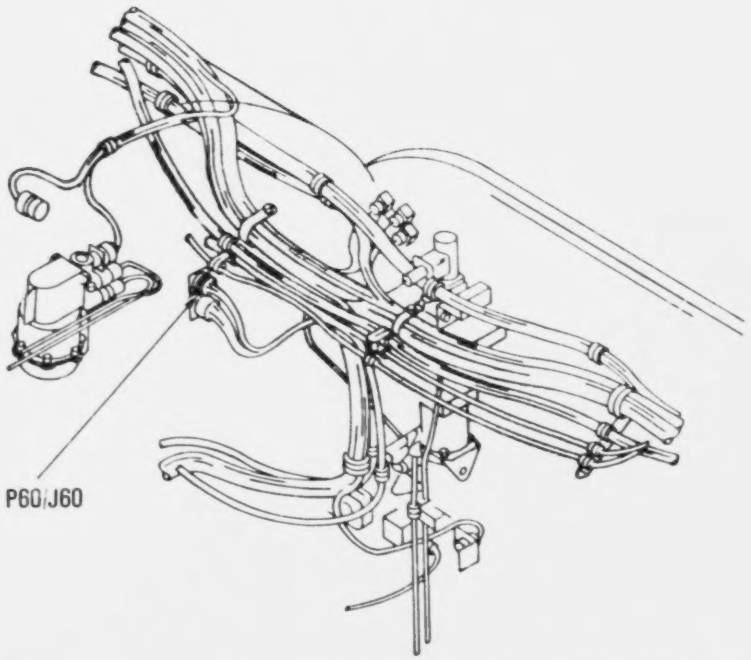
Y ACCESS TO DRIVE SYSTEM ELECTRICAL CONNECTIONS THRU R200 L325, T325, T290L, T290R, T250L AND T250R



Z ACCESS TO DRIVE SYSTEM ELECTRICAL CONNECTIONS THRU R200


MT30
P56/J1
FWD

X HORIZONTAL TRACK AND BALANCE ACCELEROMETER



A A ACCESS TO DRIVE SYSTEM ELECTRICAL CONNECTIONS THRU R200

6-1-4. DRIVE SYSTEM - POWER UP

Personnel Required:

67R10 Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Drive system visual inspection completed

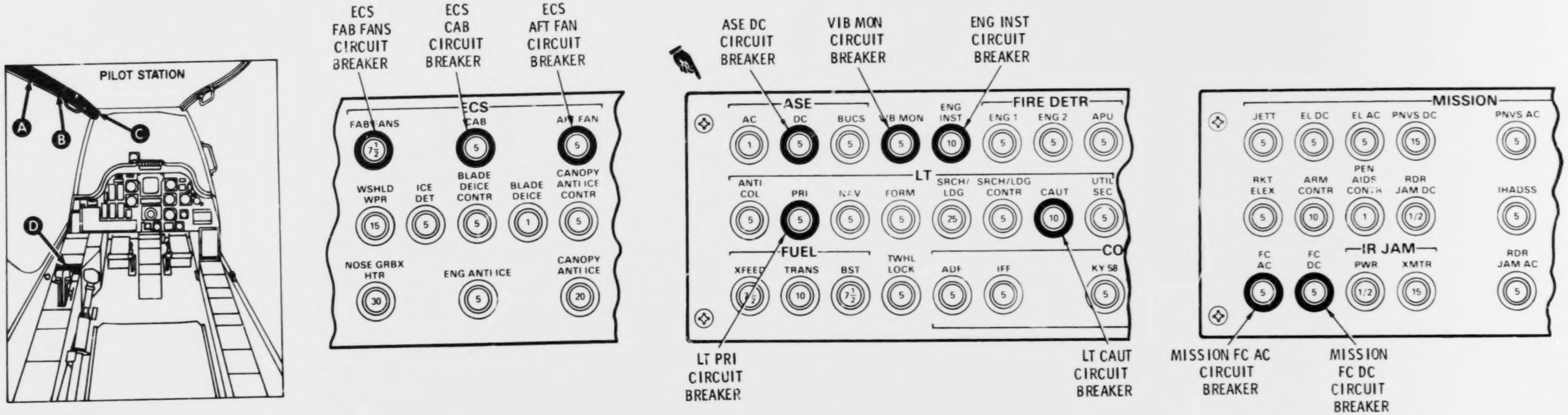
References:

TM 55-1520-238-23

A. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **EXT PWR**.

B. On pilot circuit breaker panel, check that following circuit breakers are closed:

Pilot Circuit Breaker Panel	Name
Aft	**ECS FAB FANS**
Aft	**ECS CAB**
Aft	**ECS AFT FAN**
Center	**ASE DC**
Center	**VIB MON**
Center	**ENG INST**
Center	**LT CAUT**
Center	**LT PRI**
Forward	**MISSION FC DC**
Forward	**MISSION FC AC**


PILOT STATION
A
B
C
D
ECS FAB FANS CIRCUIT BREAKER
ECS CAB CIRCUIT BREAKER
ECS AFT FAN CIRCUIT BREAKER
ECS
FAB FANS
CAB
AFT FAN
WSHLD WPR
ICE DET
BLADE DEICE CONTR
BLADE DEICE
CANOPY ANTI ICE CONTR
NOSE GRBX HTR
ENG ANTI ICE
CANOPY ANTI ICE
ASE DC CIRCUIT BREAKER
VIB MON CIRCUIT BREAKER
ENG INST CIRCUIT BREAKER
ASE
AC
DC
BUCS
VIB MON
ENG INST
FIRE DETR
ENG 1
ENG 2
APU
LT
ANTI COL
PRI
NAV
FORM
SRCH/LDG
SRCH/LDG CONTR
CAUT
UTIL SEC
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
IFF
CO
KY 58
LT PRI CIRCUIT BREAKER
LT CAUT CIRCUIT BREAKER
MISSION
JETT
EL DC
EL AC
PNVS DC
PNVS AC
RKT ELEX
ARM CONTR
PEN AIDS CONTR
RDR JAM DC
IHADSS
IR JAM
FC AC
FC DC
PWR
XMTR
RDR JAM AC
MISSION FC AC CIRCUIT BREAKER
MISSION FC DC CIRCUIT BREAKER

Ⓐ PILOT AFT CIRCUIT BREAKER PANEL

Ⓑ PILOT CENTER CIRCUIT BREAKER PANEL

Ⓒ PILOT FORWARD CIRCUIT BREAKER PANEL

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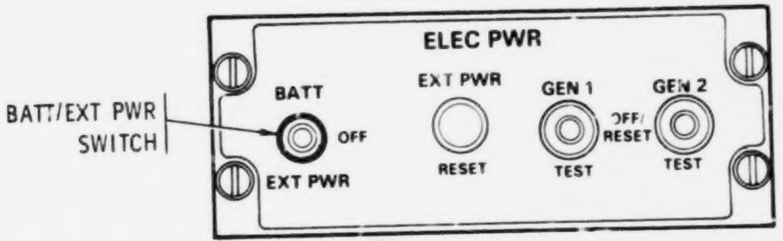
GO TO NEXT PAGE

6-1-4. DRIVE SYSTEM - POWER UP (cont)

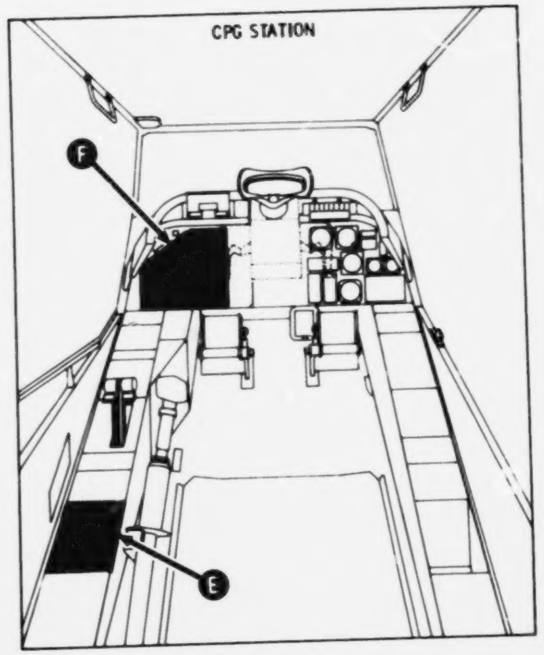
C. On CPG circuit breaker panel No. 1, check that following circuit breakers are closed:

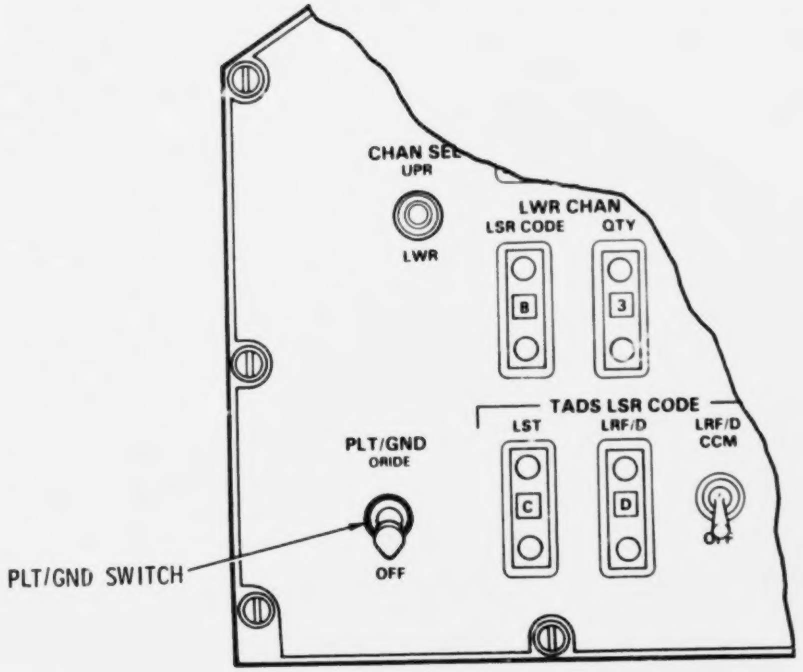
MUX CPG
MUX FAB L
MUX FAB R
FC FCC DC
FC FCC AC
EMERG BATT CAUT

D. On CPG **FIRE CONTROL** panel, set **PLT/GND** switch to **ORIDE**.

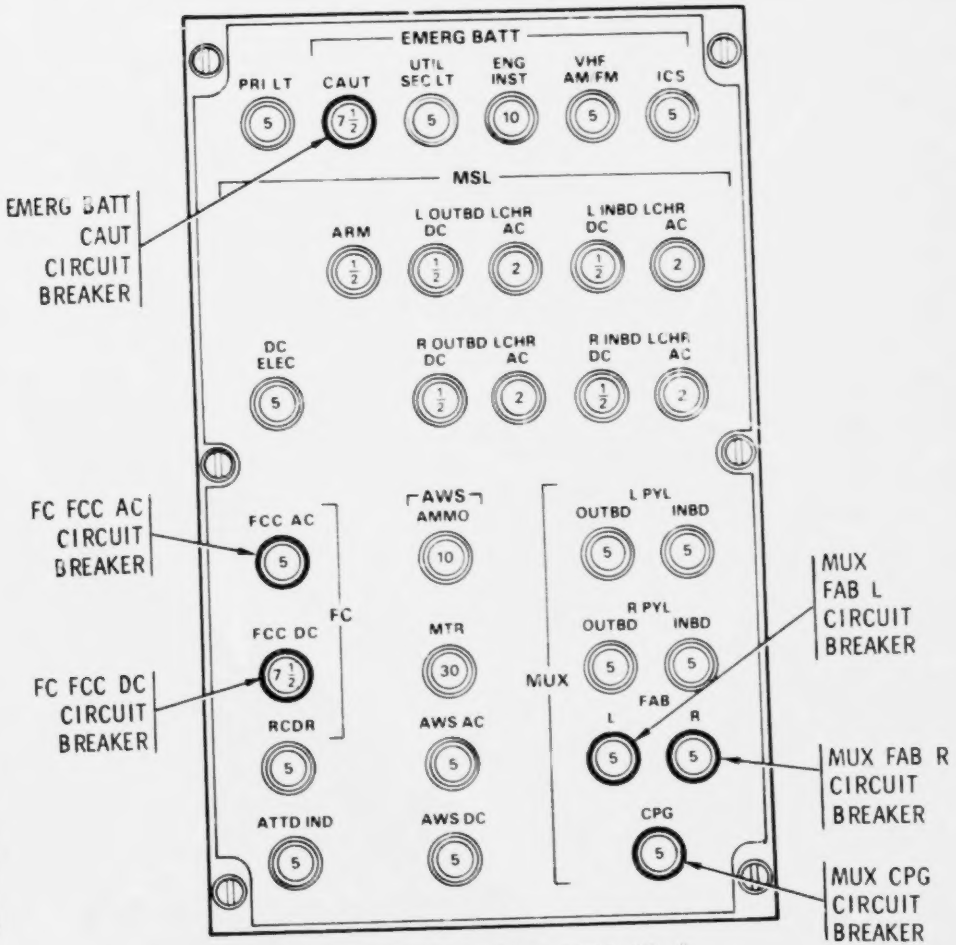

ELEC PWR
BATT
EXT PWR
GEN 1
GEN 2
OFF
OFF/RESET
EXT PWR
RESET
TEST
TEST
BATT/EXT PWR SWITCH

D PILOT ELECT PWR PANEL


CPG STATION
F
E


CHAN SEL
UPR
LWR
LWR CHAN
LSR CODE
QTY
B
3
TADS LSR CODE
LST
LRF/D
LRF/D CCM
C
D
PLT/GND
ORIDE
OFF
OFF
PLT/GND SWITCH

F CPG FIRE CONTROL PANEL


EMERG BATT
PRI LT
CAUT
UTIL SEC LT
ENG INST
VHF AM FM
ICS
MSL
ARM
L OUTBD LCHR DC AC
L INBD LCHR DC AC
DC ELEC
R OUTBD LCHR DC AC
R INBD LCHR DC AC
AWS
AMMO
L PYL
OUTBD
INBD
FCC AC
FC
FCC DC
MTR
R PYL
OUTBD
INBD
MUX
FAB
L
R
RCDR
AWS AC
ATTD IND
AWS DC
CPG
EMERG BATT CAUT CIRCUIT BREAKER
FC FCC AC CIRCUIT BREAKER
FC FCC DC CIRCUIT BREAKER
MUX FAB L CIRCUIT BREAKER
MUX FAB R CIRCUIT BREAKER
MUX CPG CIRCUIT BREAKER

E CPG CIRCUIT BREAKER PANEL NO. 1

MM04/1-908-2C

END OF TASK

6-1-5. DRIVE SYSTEM - POWER DOWN

Personnel Required:

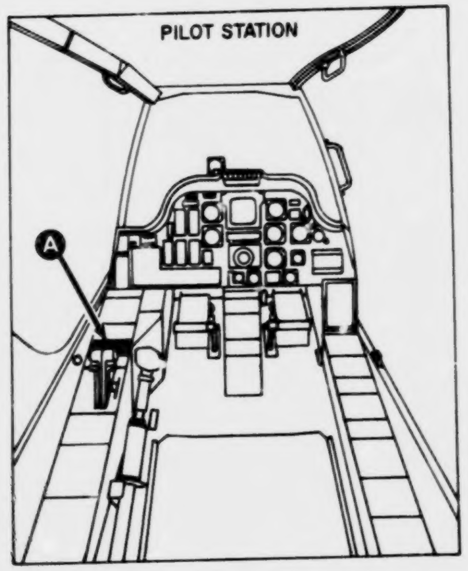
67R10 Attack Helicopter Repairer

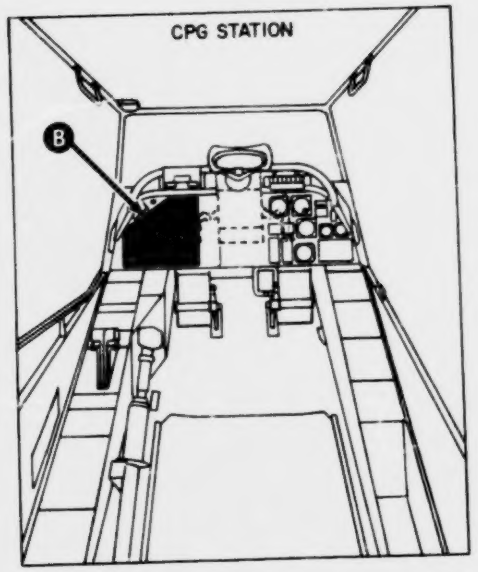
References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed DRIVE SYSTEM - POWER UP completed

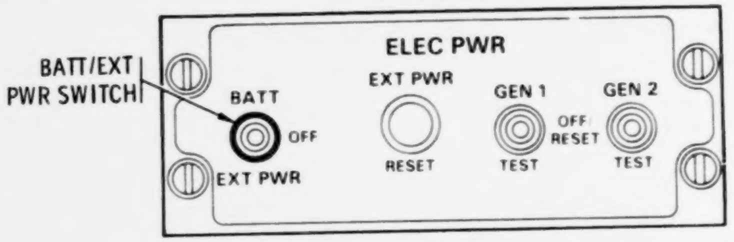

PILOT STATION
A


CPG STATION
B

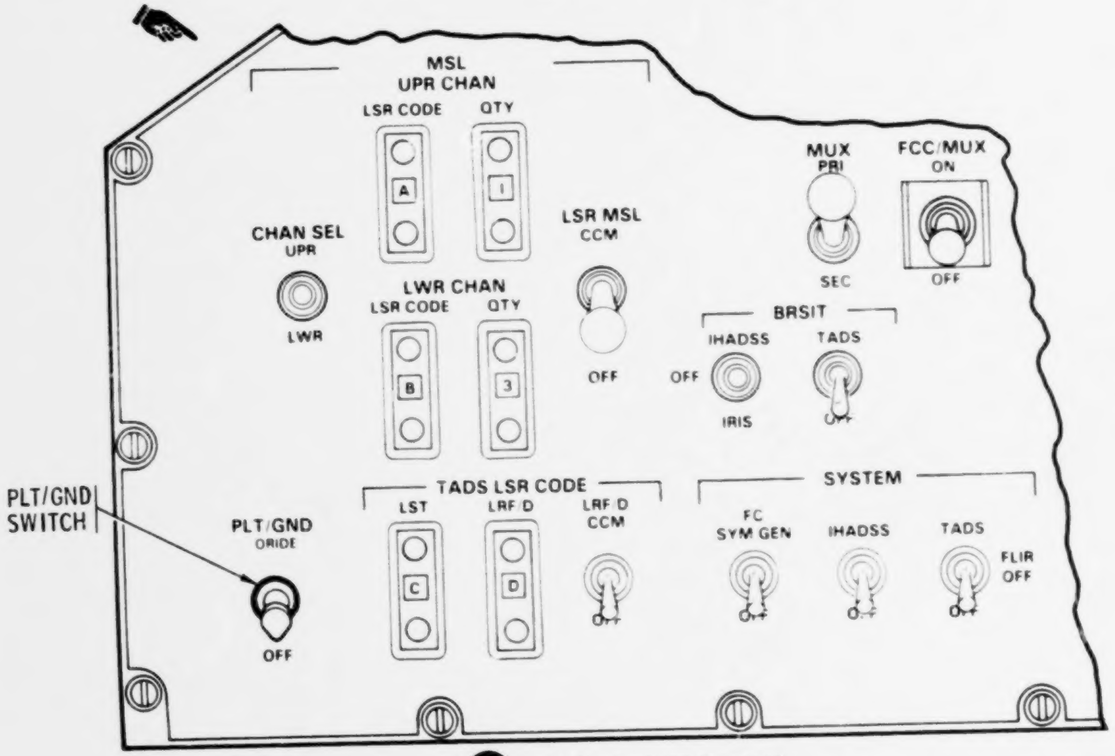
A. On CPG **FIRE CONTROL** panel, set **PLT/GND** switch to **OFF**.

B. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **OFF**.

C. Shut down and disconnect GPU from the helicopter (TM 55-1520-238-23).


BATT/EXT
PWR SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
TEST
OFF
RESET
GEN 2
TEST

A PILOT ELEC PWR PANEL


MSL
UPR CHAN
LSR CODE
QTY
A
1
CHAN SEL
UPR
LWR
LWR CHAN
LSR CODE
QTY
B
3
LSR MSL
CCM
OFF
MUX
PRI
SEC
FCC/MUX
ON
OFF
BRSIT
IHADSS
TADS
OFF
IRIS
OFF
TADS LSR CODE
LST
LRF/D
LRF/D
CCM
C
D
OFF
SYSTEM
FC
SYM GEN
IHADSS
TADS
FLIR
OFF
OFF
OFF
OFF
PLT/GND
SWITCH
PLT/GND
ORIDE
OFF

B CPG FIRE CONTROL PANEL

MM04/1-909D

END OF TASK

6-1-6. DRIVE SYSTEM - FD/LS CHECK

Personnel Required:

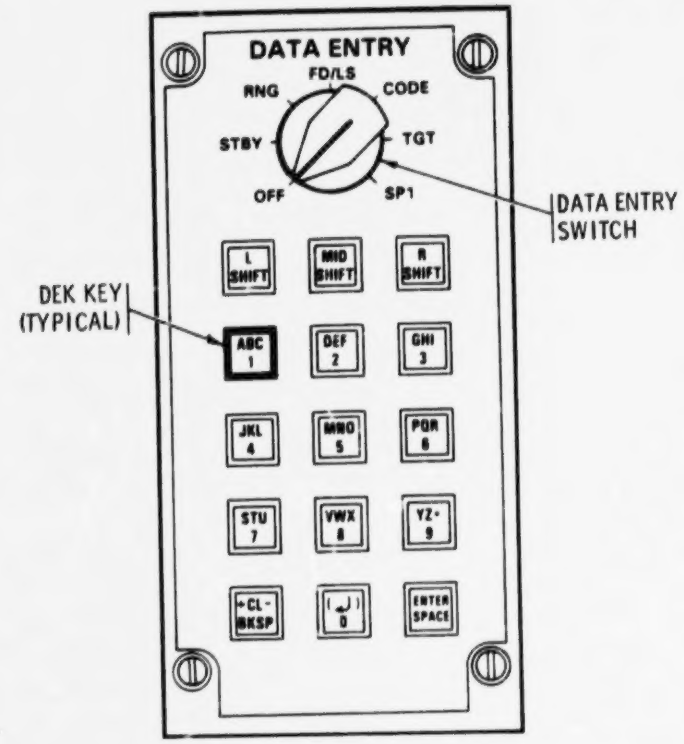
67R20	Attack Helicopter Repairer
68J10	Aircraft Fire Control Repairer
	One person to assist

References:

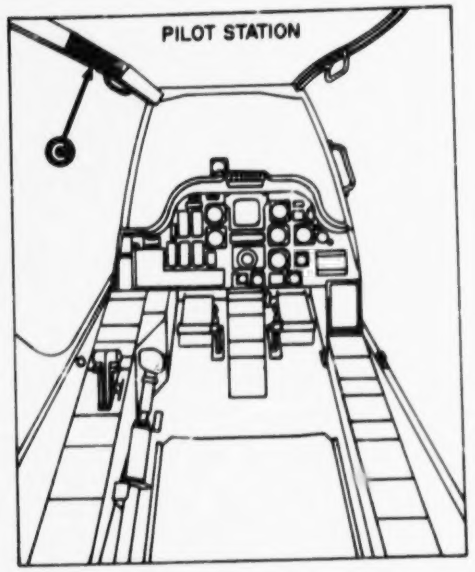
TM 55-1520-238-23

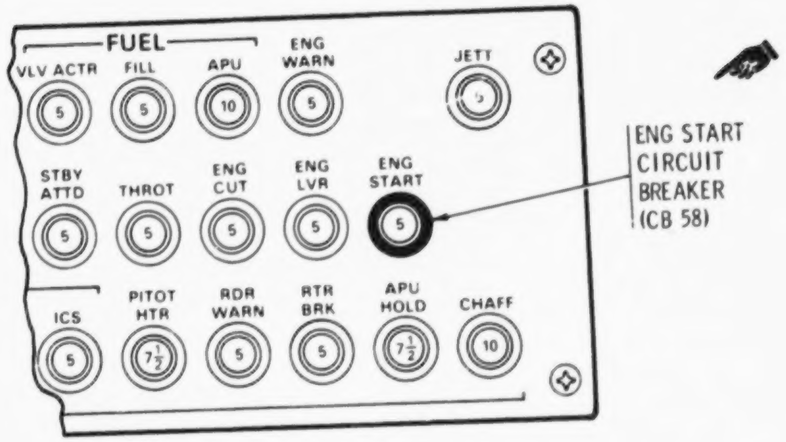
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
Chapter 1	FD/LS OPERATION - STARTING completed

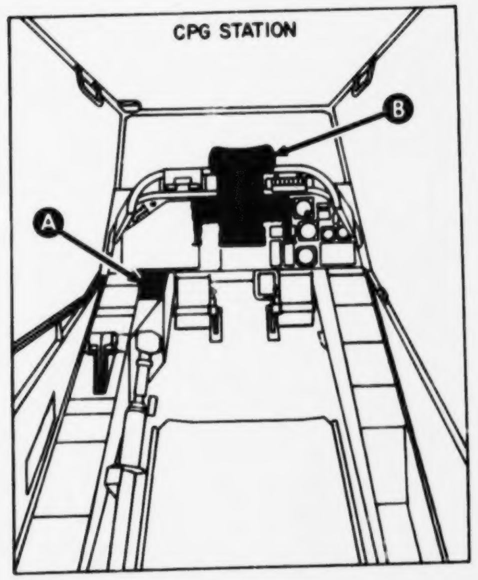

DATA ENTRY
FD/LS
RNG
CODE
STBY
TGT
OFF
SP1
DATA ENTRY SWITCH
DEK KEY (TYPICAL)
L SHIFT
MID SHIFT
R SHIFT
ABC 1
DEF 2
GHI 3
JKL 4
MNO 5
PQR 6
STU 7
VWX 8
YZ· 9
←CL· BKSP
0
ENTER SPACE

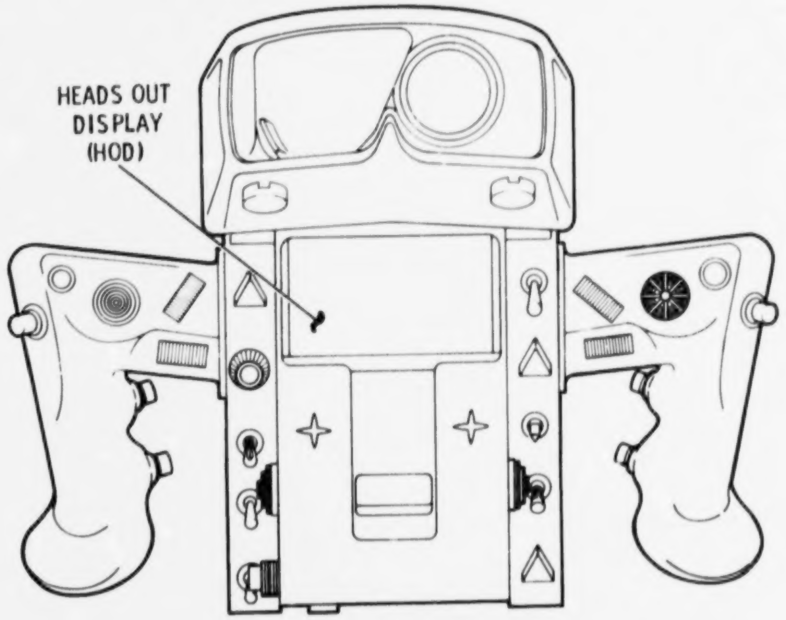
Ⓐ CPG DATA ENTRY KEYBOARD (DEK)


PILOT STATION
C


FUEL
VLV ACTR
FILL
APU
ENG WARN
JETT
STBY ATTD
THROT
ENG CUT
ENG LVR
ENG START
ICS
PITOT HTR
RDR WARN
RTR BRK
APU HOLD
CHAFF
5
10
7½
ENG START CIRCUIT BREAKER (CB 58)

Ⓒ PILOT CENTER CIRCUIT BREAKER PANEL


CPG STATION
A
B


HEADS OUT DISPLAY (HOD)

Ⓑ CPG OPTICAL RELAY TUBE (ORT)

MM04/1-915B

NOTE

- Control/switch position changes prompted by FD/LS must be performed within 30 seconds of prompt message, or a false **NO-GO** message will appear.
- If FD/LS message on heads out display (HOD) does not change within 2 seconds after prompted control/switch position change (acknowledge), discontinue FD/LS test and go to para 6-2-1.

A. Perform FD/LS check as follows:

TASK	RESULT
1. On data entry keyboard (DEK) check **DATA ENTRY** switch is set at **FD/LS**.	
2. Depress any DEK key except **ENTER SPACE** or **SHIFT** keys.	If FD/LS menu does not appear on HOD, refer to TM 9-1230-476-20-2 to troubleshoot the multiplex subsystem.
3. Depress DEK keys **0** (zero) and **8**.	If any **MUX NO-GO** appears on HOD, refer to TM 9-1230-476-20-2 to troubleshoot the multiplex subsystem.

GO TO NEXT PAGE

6-1-6. DRIVE SYSTEM - FD/LS CHECK (cont)

TASK

4. When **MUX COMMUNICATION GO** appears on HOD, go to next step.
5. On pilot center circuit breaker panel, open **ENG START** circuit breaker (C858).
6. Depress any DEK key except **ENTER SPACE** or **SHIFT**, then depress keys **1** and **9**.

See that the following is displayed on the CPG ORT HOD:

NOTE

Oil temperature readings for NGB1/2 and XMN1/2 shall be within ±2 degrees of -31°C display **(FD/LS)**.

NOSE GEAR BOX + XMSN DATA

NGB1	**XMN1**	**XMN2**	**NGB2**
OOLB	**OOLB**	**OOLB**	**OOLB**
-31°C	**-31°C**	**-31°C**	**-31°C**

RESULT

If FD/LS display appears as shown, go to next step. If FD/LS display does not appear as shown, perform the following in sequence:

(a) Perform DRIVE SYSTEM - POWER DOWN (para 6-1-5).

(b) Perform applicable repair for incorrect display, see below:

If FD/LS does not display **OOLB** for **NGB1** oil pressure, go to para 6-2-2.

If FD/LS does not display **OOLB** for **XMN1** oil pressure, go to para 6-2-3.

If FD/LS does not display **OOLB** for **XMN2** oil pressure, go to para 6-2-4.

If FD/LS does not display **OOLB** for **NGB2** oil pressure, go to para 6-2-5.

If FD/LS does not display **-31°C** for **NGB1** oil temperature, go to para 6-2-6.

If FD/LS does not display **-31°C** for **XMN1** oil temperature, go to para 6-2-7.

If FD/LS does not display **-31°C** for **XMN2** oil temperature, go to para 6-2-8.

If FD/LS does not display **-31°C** for **NGB2** oil temperature, go to para 6-2-9.

(c) Perform DRIVE SYSTEM - POWER UP (para 6-1-4).

(d) Repeat step 4. If incorrect display repeats, go to para 6-2-1.

TASK

7. Set **DATA ENTRY** switch to **STBY**.

B. Perform DRIVE SYSTEM - INDICATORS OPERATIONAL CHECK (para 6-2-1).

C. Perform FD/LS OPERATION - STOPPING (Chapter 1).

D. Perform DRIVE SYSTEM - POWER DOWN (para 6-1-5).

END OF TASK

6-2-1. DRIVE SYSTEM - INDICATORS OPERATIONAL CHECK

Personnel Required:

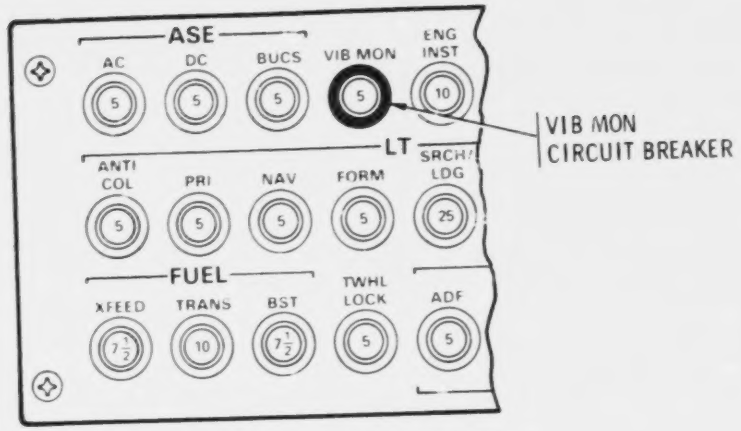
67R10 Attack Helicopter Repairer
One person to assist

References:

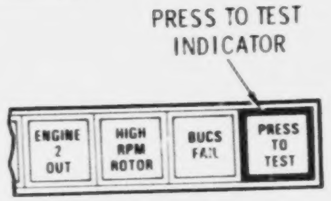
TM 55-1520-238-10
TM 55-1520-238-23

Equipment Conditions:

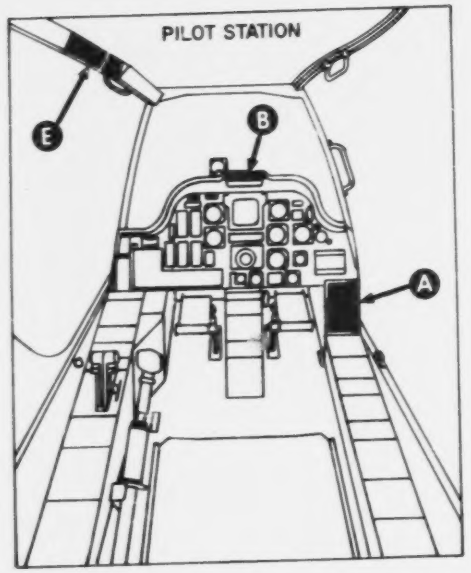
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
Para 6-1-6	DRIVE SYSTEM FD/LS CHECK - completed
Para 1-3-2	ICS connected

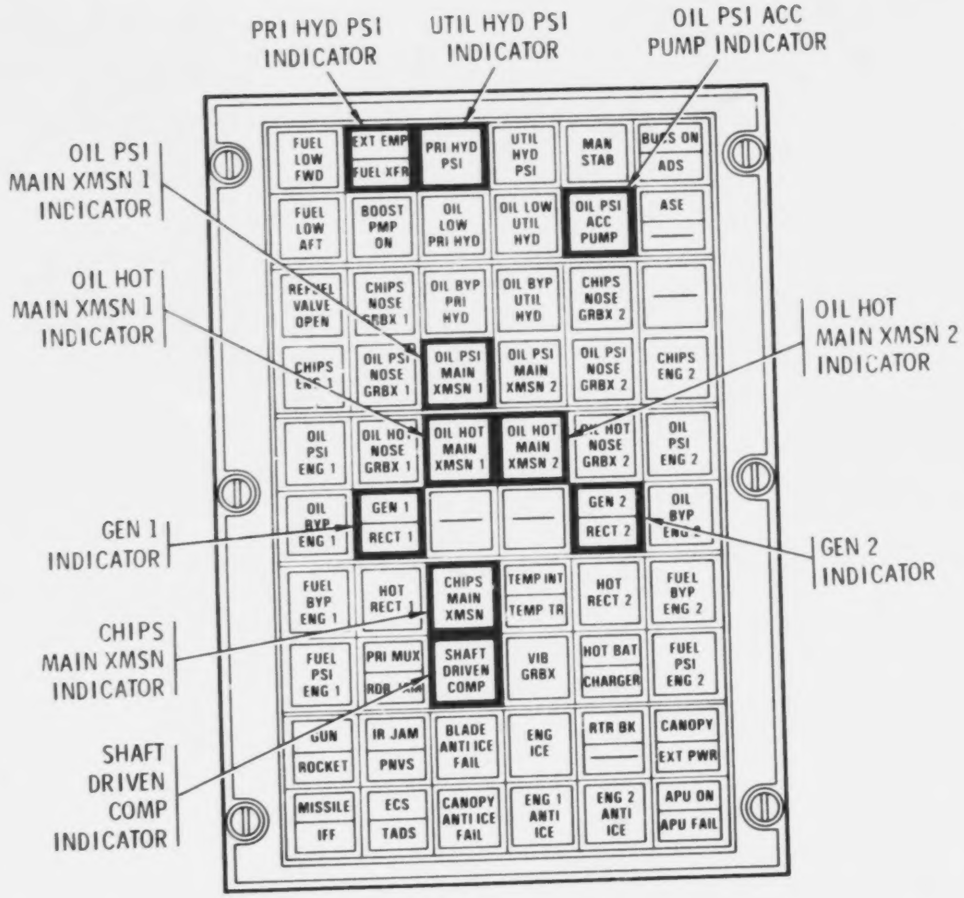

ASE
AC
DC
BUCS
VIB MON
ENG INST
LT
ANTI COL
PRI
NAV
FORM
SRCH/LDG
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
VIB MON CIRCUIT BREAKER

E PILOT CENTER CIRCUIT BREAKER PANEL

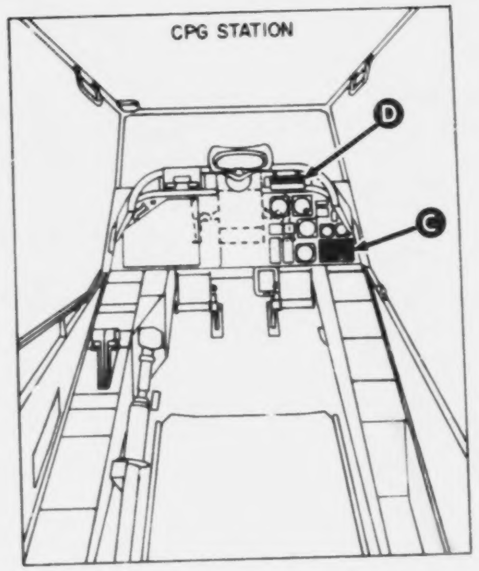

PRESS TO TEST INDICATOR
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

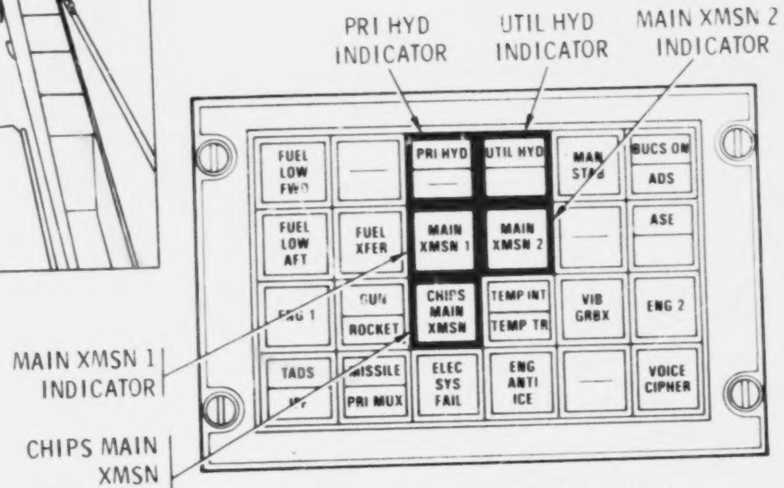
B D MASTER CAUTION/WARNING PANEL (TYPICAL)


PILOT STATION
E
B
A


PRI HYD PSI INDICATOR
UTIL HYD PSI INDICATOR
OIL PSI ACC PUMP INDICATOR
OIL PSI MAIN XMSN 1 INDICATOR
OIL HOT MAIN XMSN 1 INDICATOR
OIL HOT MAIN XMSN 2 INDICATOR
GEN 1 INDICATOR
GEN 2 INDICATOR
CHIPS MAIN XMSN INDICATOR
SHAFT DRIVEN COMP INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
ROB JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

A PILOT CAUTION/WARNING PANEL


CPG STATION
D
C


PRI HYD INDICATOR
UTIL HYD INDICATOR
MAIN XMSN 2 INDICATOR
MAIN XMSN 1 INDICATOR
CHIPS MAIN XMSN INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

C CPG CAUTION/WARNING PANEL

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GO TO NEXT PAGE

6-2-1. DRIVE SYSTEM - INDICATORS OPERATIONAL CHECK (cont)

A. Perform drive system visual inspection (TM 55-1520-238-23).

B. Complete the operational check as follows:

WARNING

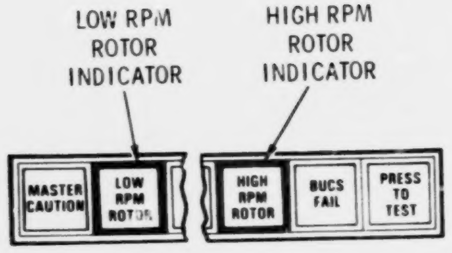
Make sure that helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance procedures. Failure to do so could result in death or serious injury.

TASK	RESULT
1. One pilot center circuit breaker panel, close **VIB MON** circuit breaker.	If **VIB MON** circuit breaker does not stay closed, go to para 6-2-30.
2. On pilot master caution/warning panel, press **PRESS TO TEST** indicator. Check pilot master caution/warning panel and pilot caution/warning panel.	If any indicators are not lighted, refer to chapter 9 to troubleshoot electrical system.
3. Release **PRESS TO TEST** indicator.	
4. On CPG master caution/warning panel, press **PRESS TO TEST** indicator. Check CPG master caution/warning panel and CPG caution/warning panel.	If any indicators are not lighted, refer to chapter 9 to troubleshoot electrical system.
5. Release **PRESS TO TEST** indicator.	
6. On pilot caution/warning panel, check **PRI HYD PSI** indicator.	If **PRI HYD PSI** indicator is not lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic system.
7. On CPG caution/warning panel, check **PRI HYD** indicator.	If **PRI HYD** indicator is not lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
8. On pilot caution/warning panel, check **UTIL HYD PSI** indicator.	If **UTIL HYD PSI** indicator is not lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.

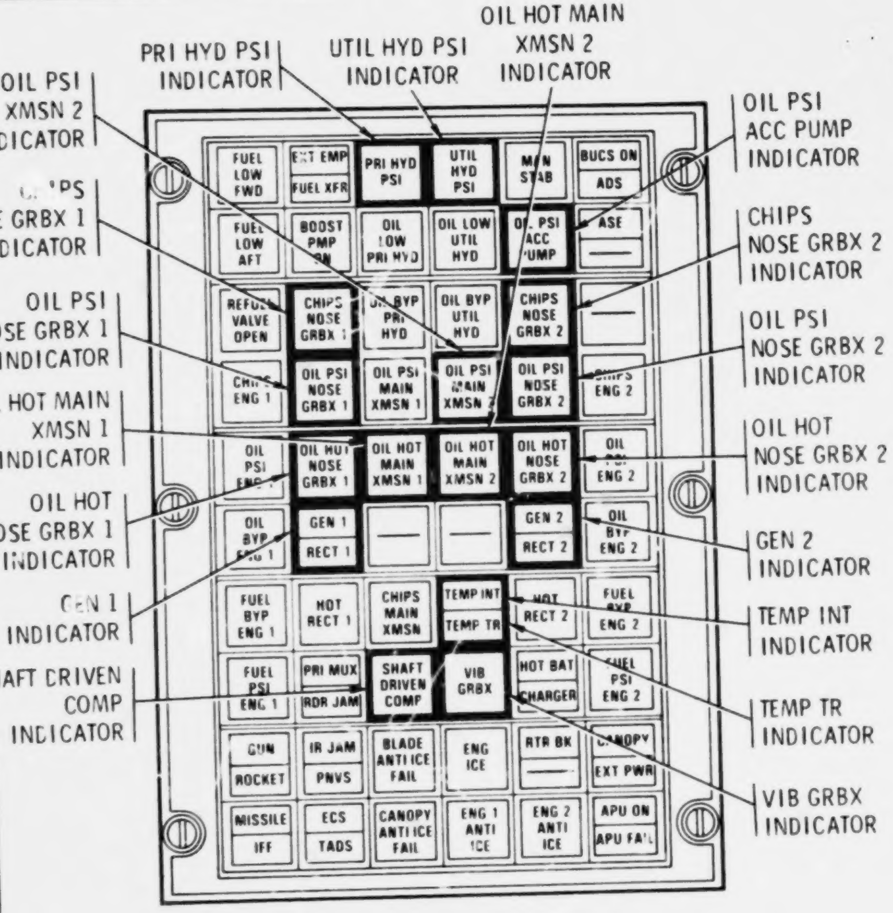
TASK	RESULT
9. On CPG caution/warning panel, check **UTIL HYD** indicator.	If **UTIL HYD** indicator is not lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
10. On pilot caution/warning panel, check **OIL PSI ACC PUMP** indicator.	If **OIL PSI ACC PUMP** indicator is not lighted, go to para 6-2-10.
11. On pilot caution/warning panel, check **SHAFT DRIVEN COMP** indicator.	If **SHAFT DRIVEN COMP** indicator is not lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
12. On pilot caution/warning panel, check **GEN 1** indicator.	If **GEN 1** indicator is not lighted, refer to chapter 9 to troubleshoot electrical system.
13. On pilot caution/warning panel, check **GEN 2** indicator.	If **GEN 2** indicator is not lighted, refer to chapter 9 to troubleshoot electrical system.
14. On pilot caution/warning panel, check **CHIPS MAIN XMSN** indicator.	If **CHIPS MAIN XMSN** indicator is lighted, go to para 6-2-11.
15. On CPG caution/warning panel, check **CHIPS MAIN XMSN** indicator.	If **CHIPS MAIN XMSN** indicator is lighted on CPG caution/warning panel but not on pilot caution/warning panel, refer to chapter 9 to troubleshoot CPG caution/warning panel.
	If **CHIPS MAIN XMSN** indicator is lighted on both caution/warning panels, go to para 6-2-11.
16. On pilot caution/warning panel, check **OIL HOT MAIN XSMN 1** indicator.	If **OIL HOT MAIN XMSN 1** indicator is lighted, go to para 6-2-12.
17. On pilot caution/warning panel, check **OIL PSI MAIN XMSN 1** indicator.	If **OIL PSI MAIN XMSN 1** indicator is not lighted, go to para 6-2-14.
18. On pilot caution/warning panel, check **OIL PSI MAIN XMSN 2** indicator.	If **OIL PSI MAIN XMSN 2** indicator is not lighted, go to para 6-2-15.

GO TO NEXT PAGE

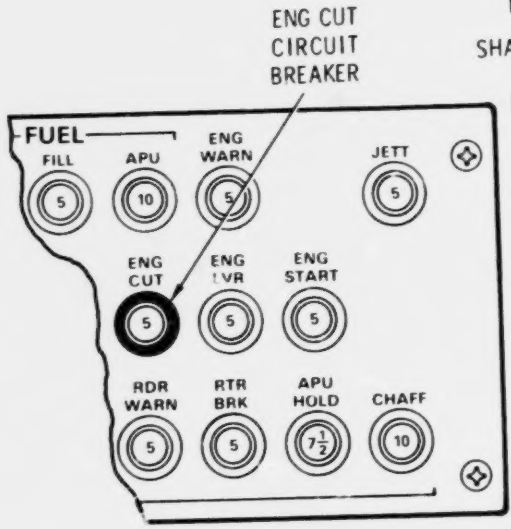
6-2-1. DRIVE SYSTEM - INDICATORS OPERATIONAL CHECK (cont)


LOW RPM ROTOR INDICATOR
HIGH RPM ROTOR INDICATOR
MASTER CAUTION
LOW RPM ROTOR
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

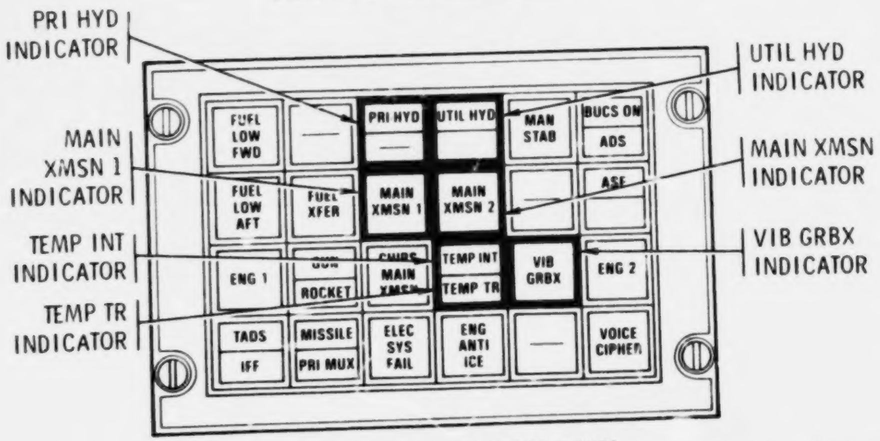
MASTER CAUTION/WARNING PANEL (TYPICAL)


PRI HYD PSI INDICATOR
UTIL HYD PSI INDICATOR
OIL HOT MAIN XMSN 2 INDICATOR
OIL PSI MAIN XMSN 2 INDICATOR
CHIPS NOSE GRBX 1 INDICATOR
OIL PSI NOSE GRBX 1 INDICATOR
OIL HOT MAIN XMSN 1 INDICATOR
OIL HOT NOSE GRBX 1 INDICATOR
GEN 1 INDICATOR
SHAFT DRIVEN COMP INDICATOR
OIL PSI ACC PUMP INDICATOR
CHIPS NOSE GRBX 2 INDICATOR
OIL PSI NOSE GRBX 2 INDICATOR
OIL HOT NOSE GRBX 2 INDICATOR
GEN 2 INDICATOR
TEMP INT INDICATOR
TEMP TR INDICATOR
VIB GRBX INDICATOR

PILOT CAUTION/WARNING PANEL


ENG CUT CIRCUIT BREAKER
FUEL
FILL
APU
ENG WARN
JETT
ENG CUT
ENG LVR
ENG START
RDR WARN
RTR BRK
APU HOLD
CHAFF

PILOT CENTER CIRCUIT BREAKER PANEL


PRI HYD INDICATOR
MAIN XMSN 1 INDICATOR
TEMP INT INDICATOR
TEMP TR INDICATOR
UTIL HYD INDICATOR
MAIN XMSN 2 INDICATOR
VIB GRBX INDICATOR

CPG CAUTION/WARNING PANEL

MM04/1-916-2B

TASK	RESULT
19. On CPG caution/warning panel, check **MAIN XMSN 1** indicator.	If **MAIN XMSN 1** indicator is lighted on CPG caution/warning panel, but **OIL HOT MAIN XMSN 1** indicator does not light on pilot caution/warning panel, refer to chapter 9 to troubleshoot CPG caution/warning panel. If **MAIN XMSN 1** indicator is lighted on CPG caution/warning panel and **OIL HOT MAIN XMSN 1** indicator lights on pilot caution/warning panel, go to para 6-2-12.
20. On pilot cauton/warning panel, check **OIL HOT MAIN XMSN 2** indicator.	If **OIL HOT MAIN XMSN 2** indicator is lighted, go to para 6-2-13.
21. On CPG caution/warning panel, check **MAIN XMSN 2** indicator.	If **MAIN XMSN 2** indicator is lighted on CPG caution/warning panel, but **OIL HOT MAIN XMSN 2** indicator does not light on pilot caution/warning panel, refer to chapter 9 to troubleshoot CPG caution/warning panel. If **MAIN XMSN 2** indicator is lighted on CPG caution/warning panel and **OIL HOT MAIN XMSN 2** indicator lights on pilot caution/warning panel, go to para 6-2-13.
22. On pilot caution/warning panel, check **TEMP INT** indicator.	If **TEMP INT** indicator is lighted, go to para 6-2-16.
23. On CPG caution/warning panel, check **TEMP INT** indicator.	If **TEMP INT** indicator is lighted on CPG caution/warning panel but not on pilot caution/warning panel, refer to chapter 9 to troubleshoot CPG caution/warning panel. If **TEMP INT** indicator is lighted on both caution/warning panels, go to para 6-2-16.
24. On pilot caution/warning panel, check **TEMP TR** indicator.	If **TEMP TR** indicator is lighted, go to para 6-2-17.

GO TO NEXT PAGE

6-2-1 DRIVE SYSTEM - INDICATORS OPERATIONAL CHECK (cont)

TASK	RESULT
25. On CPG caution/warning panel, check **TEMP TR** indicator.	If **TEMP TR** indicator is lighted on CPG caution/warning panel but not on pilot caution/warning panel, refer to chapter 9 to troubleshoot CPG caution/warning panel.
	If **TEMP TR** indicator is lighted on both caution/warning panels, go to para 6-2-17.
26. On pilot caution/warning panel, check **OIL HOT NOSE GRBX 1** indicator.	If **OIL HOT NOSE GRBX 1** indicator is lighted, go to para 6-2-18.
27. On pilot caution/warning panel, check **OIL HOT NOSE GRBX 2** indicator.	If **OIL HOT NOSE GRBX 2** indicator is lighted, go to para 6-2-19.
28. On pilot caution/warning panel, check **OIL PSI NOSE GRBX 1** indicator.	If **OIL PSI NOSE GRBX 1** indicator is not lighted, go to para 6-2-20.
29. On pilot caution/warning panel, check **OIL PSI NOSE GRBX 2** indicator.	If **OIL PSI NOSE GRBX 2** indicator is not lighted, go to para 6-2-21.
30. On pilot caution/warning panel, check **CHIPS NOSE GRBX 1** indicator.	If **CHIPS NOSE GRBX 1** indicator is lighted, go to para 6-2-22.
31. On pilot caution/warning panel, check **CHIPS NOSE GRBX 2** indicator.	If **CHIPS NOSE GRBX 2** indicator is lighted, go to para 6-2-23.
32. On pilot master caution/warning panel, check **LOW RPM ROTOR** indicator.	If **LOW RPM ROTOR** indicator is not lighted, go to para 6-2-24.
33. On CPG master caution/warning panel, check **LOW RPM ROTOR** indicator.	If **LOW RPM ROTOR** indicator is not lighted, go to para 6-2-25.
34. On pilot and CPG master caution/warning panels, check **HI RPM ROTOR** indicators.	If either or both **HI RPM ROTOR** indicators is lighted, go to para 6-2-26.
35. On pilot and CPG caution/warning panels, check **VIB GRBX** indicators.	If both **VIB GRBX** indicators are lighted, go to para 6-2-28.
	If **VIB GRBX** indicator is lighted on CPG caution/warning panel but not on pilot caution/warning panel, refer to chapter 9 to troubleshoot CPG caution/warning panel.
36. On pilot center circuit breaker panel, check **ENG CUT** circuit breaker.	If **ENG CUT** circuit breaker does not stay closed, go to para 6-2-27.
37. Start and run APU (TM 55-1520-238-23).	
38. Shut down GPU (TM 55-1520-238-23).	
39. On pilot caution/warning panel, check **PRI HYD PSI** indicator.	If **PRI HYD PSI** indicator is lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
40. On CPG caution/warning panel, check **PRI HYD** indicator.	If **PRI HYD** indicator is lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
41. On pilot caution/warning panel, check **UTIL HYD PSI** indicator.	If **UTIL HYD PSI** indicator is lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
42. On CPG caution/warning panel, check **UTIL HYD** indicator.	If **UTIL HYD** indicator is lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
43. On pilot caution/warning panel, Check **OIL PSI ACC PUMP** indicator.	If **OIL PSI ACC PUMP** indicator is lighted, go to para 6-2-29.
44. On pilot caution/warning panel, check **SHAFT DRIVEN COMP** indicator.	If **SHAFT DRIVEN COMP** indicator is lighted, refer to chapter 7 to troubleshoot hydraulic and pneumatic systems.
45. On pilot caution/warning panel, check **GEN 1** indicator.	If **GEN 1** indicator is lighted, refer to chapter 9 to troubleshoot electrical system.
46. On pilot caution/warning panel, check **GEN 2** indicator.	If **GEN 2** indicator is lighted, refer to chapter 9 to troubleshoot electrical system.

C. Disconnect GPU from helicopter (TM 55-1520-238-23).

NOTE

If drive system vibration or dynamic operational check is to be done, omit steps D thru F.

D. Shut down APU (TM 55-1520-238-23).

E. Perform DRIVE SYSTEM - POWER DOWN (para 6-1-5).

F. Secure access doors and panels (TM 55-1520-238-23).

END OF TASK

6-2-2. FD/LS NGB1 OIL PRESSURE DISPLAY - IS NOT OOLB

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

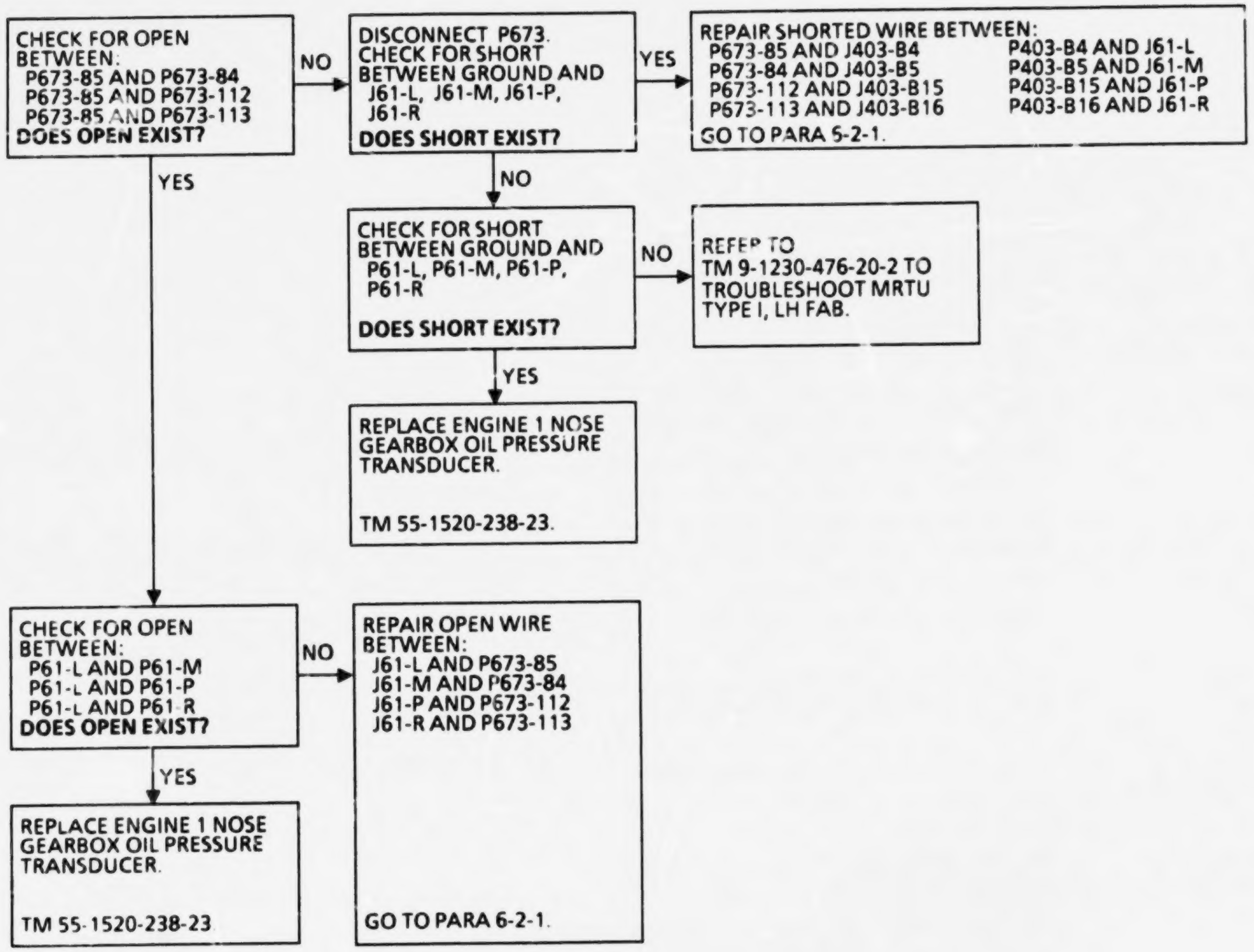
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 9-1230-476-20-2

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L60 fairing open



CHECK FOR OPEN BETWEEN:
P673-85 AND P673-84
P673-85 AND P673-112
P673-85 AND P673-113
DOES OPEN EXIST?

DISCONNECT P673.
CHECK FOR SHORT BETWEEN GROUND AND J61-L, J61-M, J61-P, J61-R
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P673-85 AND J403-B4
P673-84 AND J403-B5
P673-112 AND J403-B15
P673-113 AND J403-B16
P403-B4 AND J61-L
P403-B5 AND J61-M
P403-B15 AND J61-P
P403-B16 AND J61-R
GO TO PARA 5-2-1.

CHECK FOR SHORT BETWEEN GROUND AND P61-L, P61-M, P61-P, P61-R
DOES SHORT EXIST?

REFEP TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, LH FAB.

REPLACE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P61-L AND P61-M
P61-L AND P61-P
P61-L AND P61-R
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
J61-L AND P673-85
J61-M AND P673-84
J61-P AND P673-112
J61-R AND P673-113
GO TO PARA 6-2-1.

REPLACE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23

END OF TASK

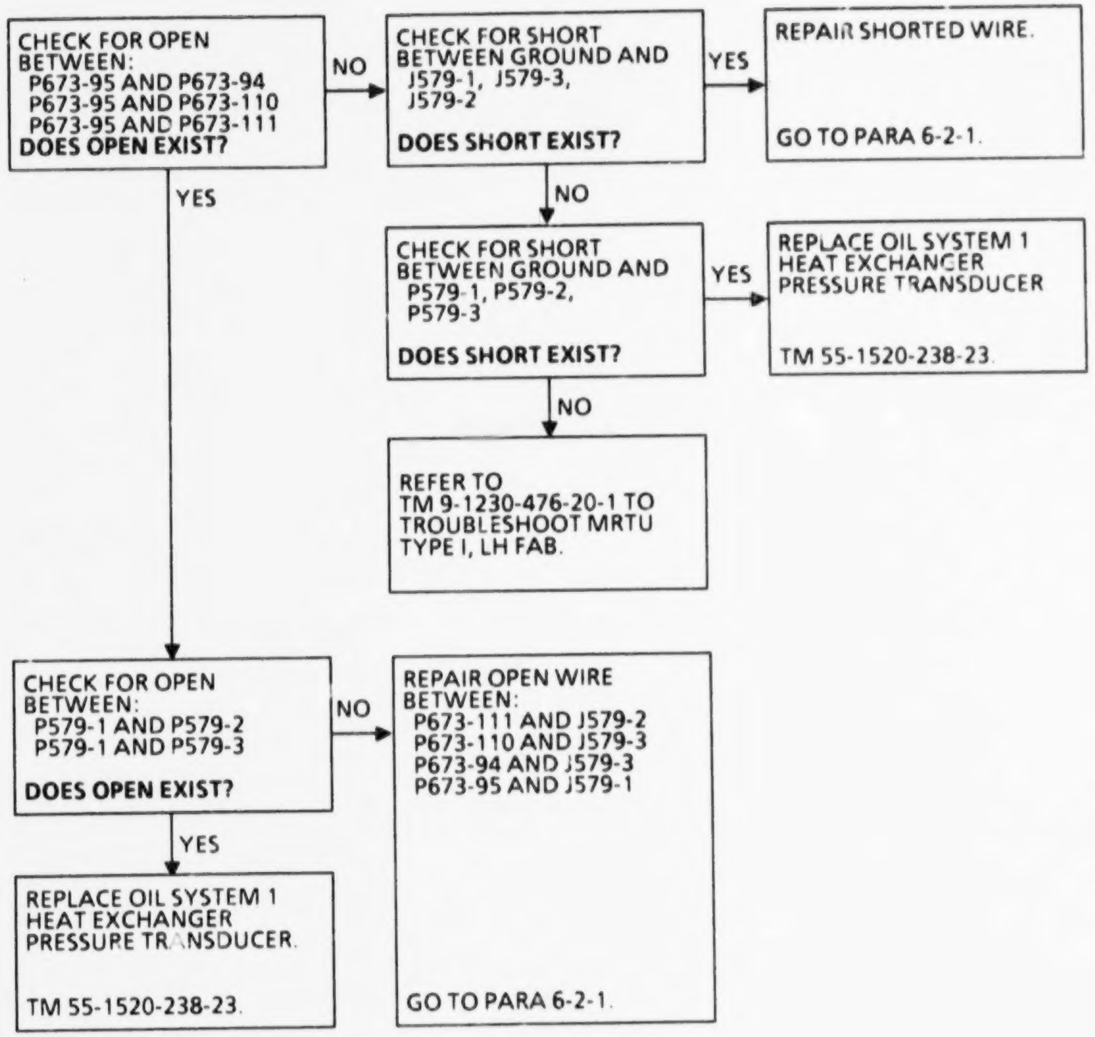
6-2-3. FD/LS XMN1 OIL PRESSURE DISPLAY - IS NOT OOLB

Tools: (para 6-2-2)

Personnel Required: (para 6-2-2)

References: (para 6-2-2)

Equipment Conditions: (para 6-2-2)



CHECK FOR OPEN BETWEEN:
P673-95 AND P673-94
P673-95 AND P673-110
P673-95 AND P673-111
DOES OPEN EXIST?

CHECK FOR SHORT BETWEEN GROUND AND
J579-1, J579-3,
J579-2
DOES SHORT EXIST?

REPAIR SHORTED WIRE.
GO TO PARA 6-2-1.

CHECK FOR SHORT BETWEEN GROUND AND
P579-1, P579-2,
P579-3
DOES SHORT EXIST?

REPLACE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER
TM 55-1520-238-23.

REFER TO TM 9-1230-476-20-1 TO TROUBLESHOOT MRTU TYPE I, LH FAB.

CHECK FOR OPEN BETWEEN:
P579-1 AND P579-2
P579-1 AND P579-3
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
P673-111 AND J579-2
P673-110 AND J579-3
P673-94 AND J579-3
P673-95 AND J579-1
GO TO PARA 6-2-1.

REPLACE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER.
TM 55-1520-238-23.

END OF TASK

6-2-4. FD/LS XMN2 OIL PRESSURE DISPLAY - IS NOT OOLB

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

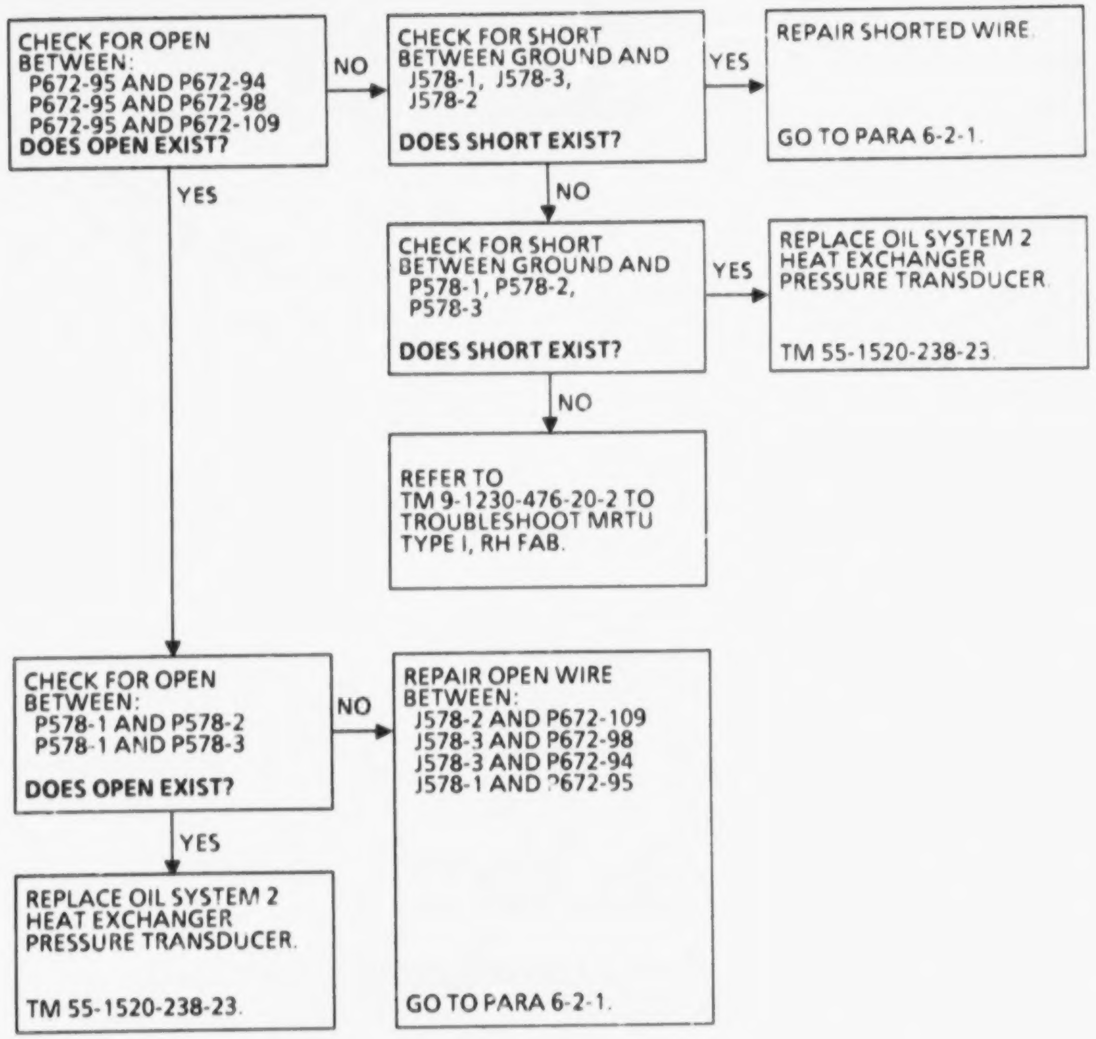
68F10 Aircraft Electrician
One person to assist

References:

TM 55-1520-238-23
TM 9-1230-476-20-2

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R60 fairing open



CHECK FOR OPEN BETWEEN:
P672-95 AND P672-94
P672-95 AND P672-98
P672-95 AND P672-109
DOES OPEN EXIST?

CHECK FOR SHORT BETWEEN GROUND AND
J578-1, J578-3,
J578-2
DOES SHORT EXIST?

REPAIR SHORTED WIRE.

GO TO PARA 6-2-1.

CHECK FOR SHORT BETWEEN GROUND AND
P578-1, P578-2,
P578-3
DOES SHORT EXIST?

REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER.

TM 55-1520-238-23.

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, RH FAB.

CHECK FOR OPEN BETWEEN:
P578-1 AND P578-2
P578-1 AND P578-3
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
J578-2 AND P672-109
J578-3 AND P672-98
J578-3 AND P672-94
J578-1 AND P672-95

GO TO PARA 6-2-1.

REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER.

TM 55-1520-238-23.

END OF TASK

268-454

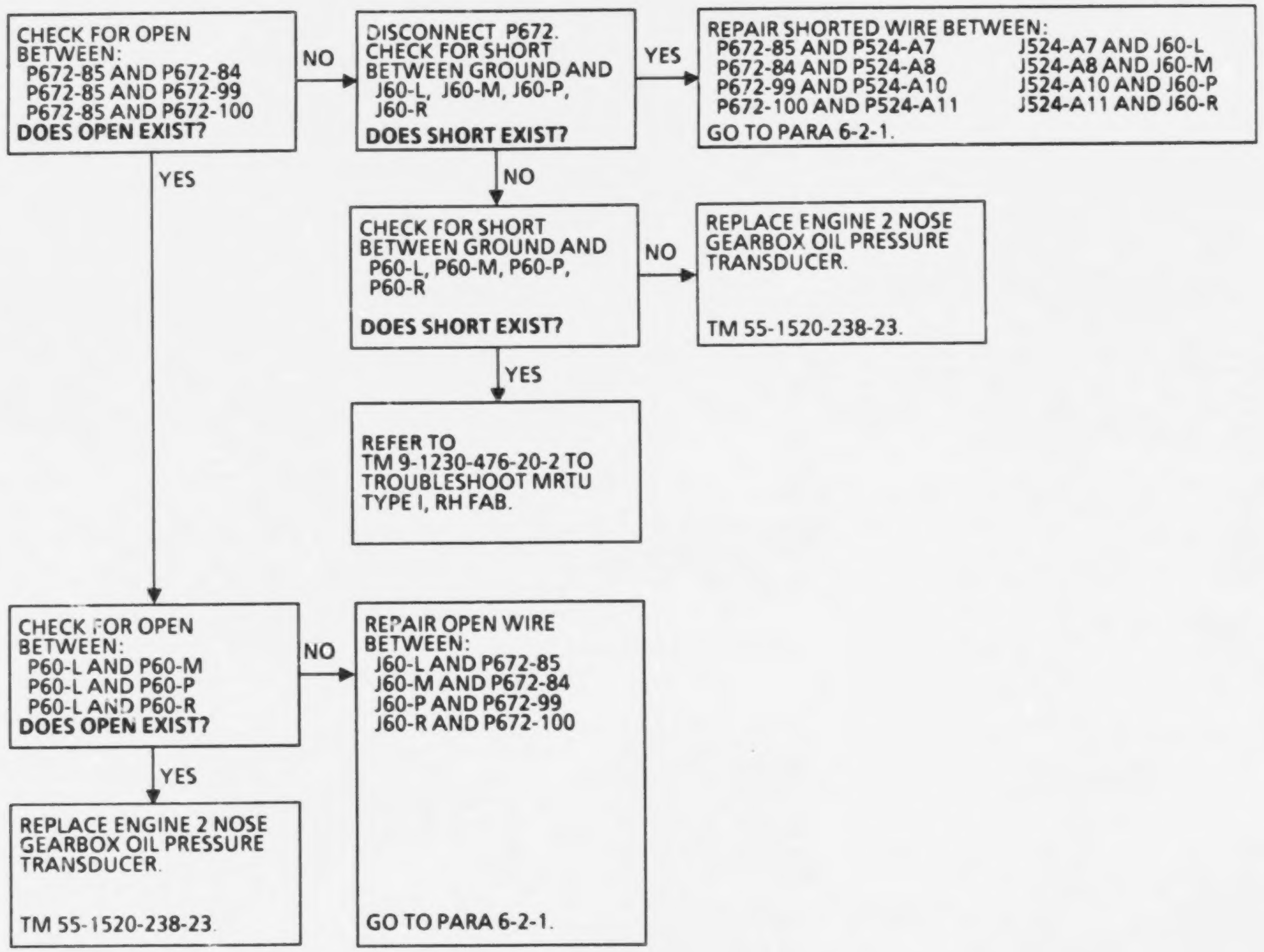
6-2-5. FD/LS NGB2 OIL PRESSURE DISPLAY - IS NOT OOLB

Tools: (para 6-2-4)

Personnel Required: (para 6-2-4)

References: (para 6-2-4)

Equipment Conditions: (para 6-2-4)


CHECK FOR OPEN BETWEEN:
P672-85 AND P672-84
P672-85 AND P672-99
P672-85 AND P672-100
DOES OPEN EXIST?
NO
DISCONNECT P672.
CHECK FOR SHORT BETWEEN GROUND AND J60-L, J60-M, J60-P, J60-R
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN:
P672-85 AND P524-A7
P672-84 AND P524-A8
P672-99 AND P524-A10
P672-100 AND P524-A11
J524-A7 AND J60-L
J524-A8 AND J60-M
J524-A10 AND J60-P
J524-A11 AND J60-R
GO TO PARA 6-2-1.
NO
CHECK FOR SHORT BETWEEN GROUND AND P60-L, P60-M, P60-P, P60-R
DOES SHORT EXIST?
NO
REPLACE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.
YES
REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, RH FAB.
YES
CHECK FOR OPEN BETWEEN:
P60-L AND P60-M
P60-L AND P60-P
P60-L AND P60-R
DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN:
J60-L AND P672-85
J60-M AND P672-84
J60-P AND P672-99
J60-R AND P672-100
GO TO PARA 6-2-1.
YES
REPLACE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.

END OF TASK

6-2-6. FD/LS NGB1 OIL TEMPERATURE DISPLAY - DOES NOT INDICATE -31 DEGREES C

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

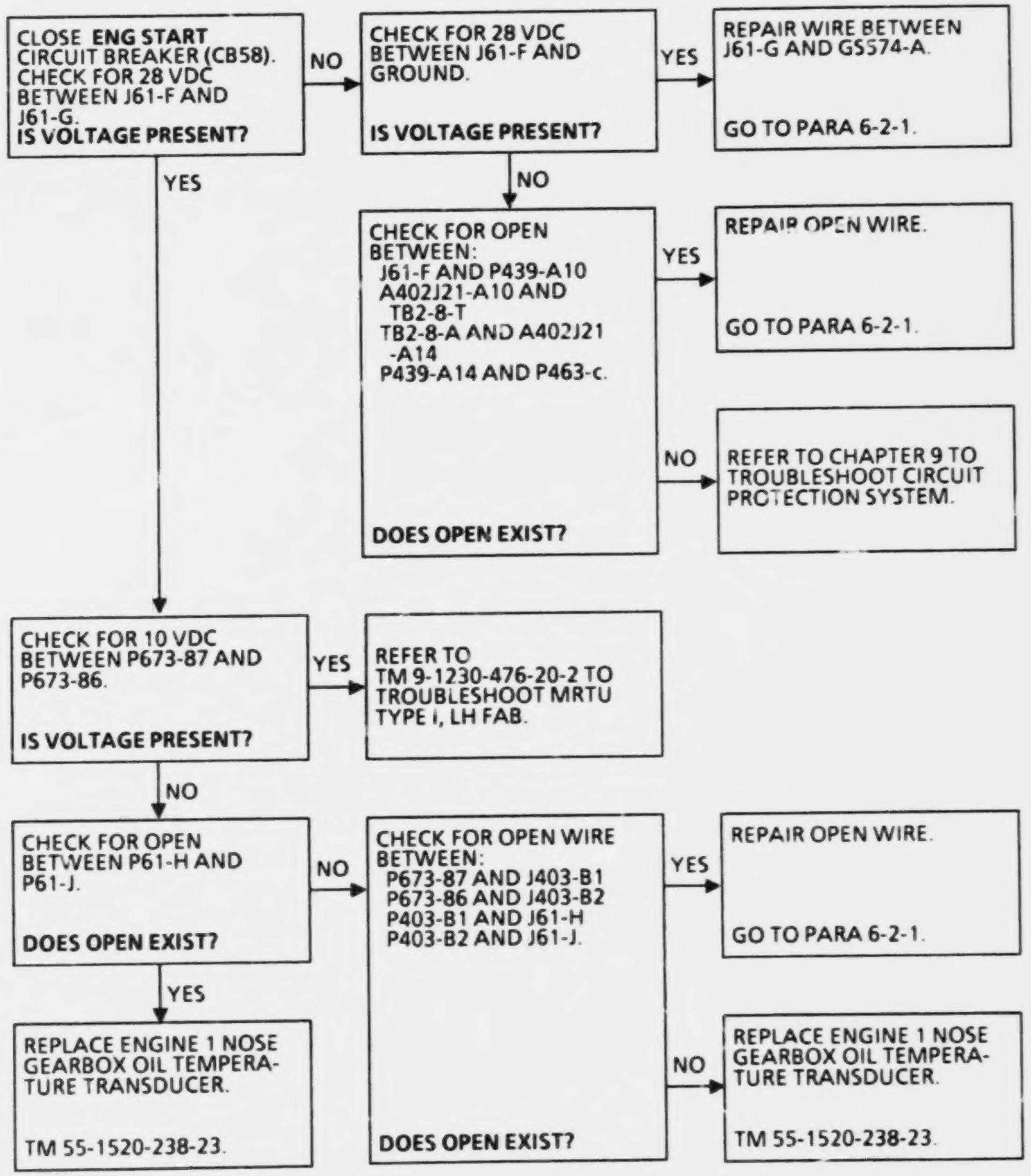
TM 55-1520-238-23
TM 9-1230-476-20-2

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 panel removed
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CLOSE ENG START CIRCUIT BREAKER (CB58). CHECK FOR 28 VDC BETWEEN J61-F AND J61-G.
IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN J61-F AND GROUND.
IS VOLTAGE PRESENT?
YES
REPAIR WIRE BETWEEN J61-G AND GS574-A.
GO TO PARA 6-2-1.
NO
CHECK FOR OPEN BETWEEN:
J61-F AND P439-A10
A402J21-A10 AND TB2-8-T
TB2-8-A AND A402J21-A14
P439-A14 AND P463-c.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
YES
CHECK FOR 10 VDC BETWEEN P673-87 AND P673-86.
IS VOLTAGE PRESENT?
YES
REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, LH FAB.
NO
CHECK FOR OPEN BETWEEN P61-H AND P61-J.
DOES OPEN EXIST?
NO
CHECK FOR OPEN WIRE BETWEEN:
P673-87 AND J403-B1
P673-86 AND J403-B2
P403-B1 AND J61-H
P403-B2 AND J61-J.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1.
NO
REPLACE ENGINE 1 NOSE GEARBOX OIL TEMPERATURE TRANSDUCER.
TM 55-1520-238-23.
YES
REPLACE ENGINE 1 NOSE GEARBOX OIL TEMPERATURE TRANSDUCER.
TM 55-1520-238-23.

END OF TASK

6-2-7. FD/LS XMN1 OIL TEMPERATURE DISPLAY - IS NOT -31 DEGREES C

Tools: (para 6-2-6)

Personnel Required: (para 6-2-6)

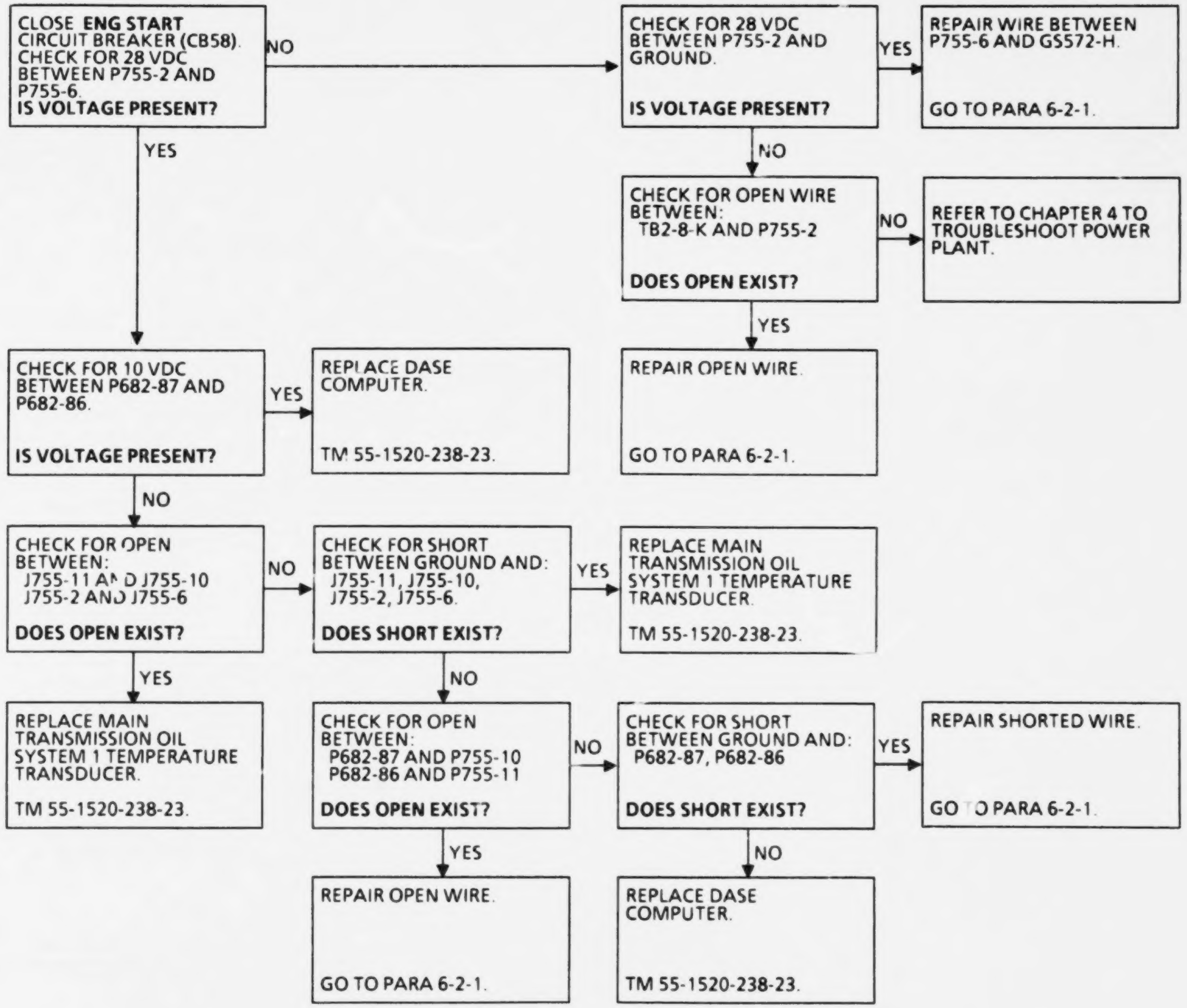
References: (para 6-2-6)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed Access provisions - T250L, T250R, T290L, T290R, R295, L325, and T325 access doors open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CLOSE ENG START CIRCUIT BREAKER (CB58). CHECK FOR 28 VDC BETWEEN P755-2 AND P755-6. IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN P755-2 AND GROUND. IS VOLTAGE PRESENT?
YES
REPAIR WIRE BETWEEN P755-6 AND GS572-H. GO TO PARA 6-2-1.
NO
CHECK FOR OPEN WIRE BETWEEN: TB2-8-K AND P755-2 DOES OPEN EXIST?
NO
REFER TO CHAPTER 4 TO TROUBLESHOOT POWER PLANT.
YES
REPAIR OPEN WIRE. GO TO PARA 6-2-1.
YES
CHECK FOR 10 VDC BETWEEN P682-87 AND P682-86. IS VOLTAGE PRESENT?
YES
REPLACE DASE COMPUTER. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: J755-11 AND J755-10 J755-2 AND J755-6 DOES OPEN EXIST?
NO
CHECK FOR SHORT BETWEEN GROUND AND: J755-11, J755-10, J755-2, J755-6. DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 TEMPERATURE TRANSDUCER. TM 55-1520-238-23.
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 TEMPERATURE TRANSDUCER. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P682-87 AND P755-10 P682-86 AND P755-11 DOES OPEN EXIST?
NO
CHECK FOR SHORT BETWEEN GROUND AND: P682-87, P682-86 DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE. GO TO PARA 6-2-1.
YES
REPAIR OPEN WIRE. GO TO PARA 6-2-1.
NO
REPLACE DASE COMPUTER. TM 55-1520-238-23.

END OF TASK

6-2-8. FD/LS XMN2 OIL TEMPERATURE DISPLAY - IS NOT -31 DEGREES C

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter An/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

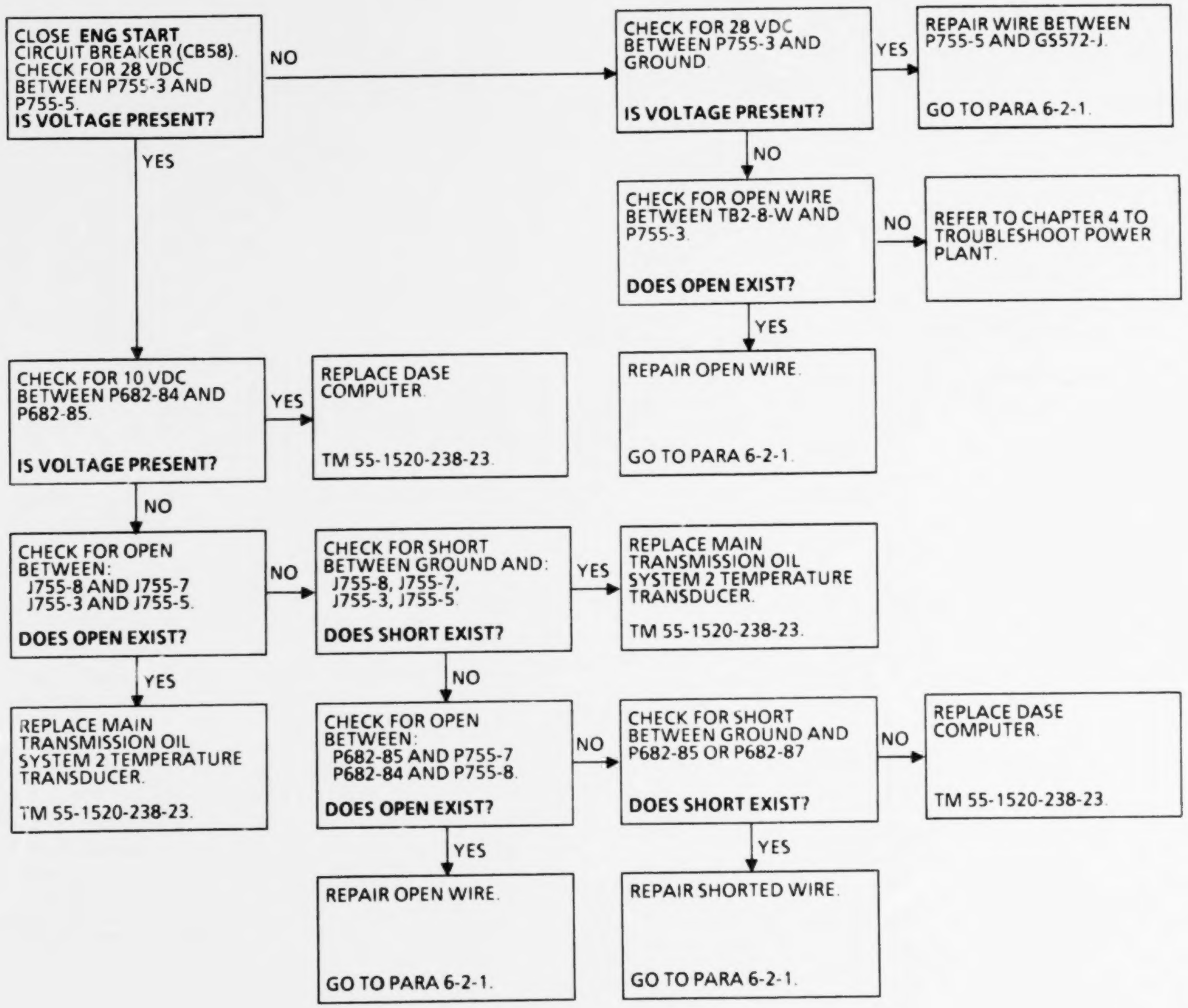
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 panel removed
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CLOSE **ENG START** CIRCUIT BREAKER (CB58). CHECK FOR 28 VDC BETWEEN P755-3 AND P755-5. **IS VOLTAGE PRESENT?**
NO
CHECK FOR 28 VDC BETWEEN P755-3 AND GROUND. **IS VOLTAGE PRESENT?**
YES
REPAIR WIRE BETWEEN P755-5 AND GS572-J. GO TO PARA 6-2-1.
NO
CHECK FOR OPEN WIRE BETWEEN TB2-8-W AND P755-3. **DOES OPEN EXIST?**
NO
REFER TO CHAPTER 4 TO TROUBLESHOOT POWER PLANT.
YES
REPAIR OPEN WIRE. GO TO PARA 6-2-1.
YES
CHECK FOR 10 VDC BETWEEN P682-84 AND P682-85. **IS VOLTAGE PRESENT?**
YES
REPLACE DASE COMPUTER. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: J755-8 AND J755-7 J755-3 AND J755-5. **DOES OPEN EXIST?**
NO
CHECK FOR SHORT BETWEEN GROUND AND: J755-8, J755-7, J755-3, J755-5. **DOES SHORT EXIST?**
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 TEMPERATURE TRANSDUCER. TM 55-1520-238-23.
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 TEMPERATURE TRANSDUCER. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P682-85 AND P755-7 P682-84 AND P755-8. **DOES OPEN EXIST?**
NO
CHECK FOR SHORT BETWEEN GROUND AND P682-85 OR P682-87. **DOES SHORT EXIST?**
NO
REPLACE DASE COMPUTER. TM 55-1520-238-23.
YES
REPAIR OPEN WIRE. GO TO PARA 6-2-1.
YES
REPAIR SHORTED WIRE. GO TO PARA 6-2-1.

END OF TASK

6-2-9. FD/LS NGB2 OIL TEMPERATURE DISPLAY - IS NOT -31 DEGREES C

Tools: (para 6-2-8)

Personnel Required: (para 6-2-8)

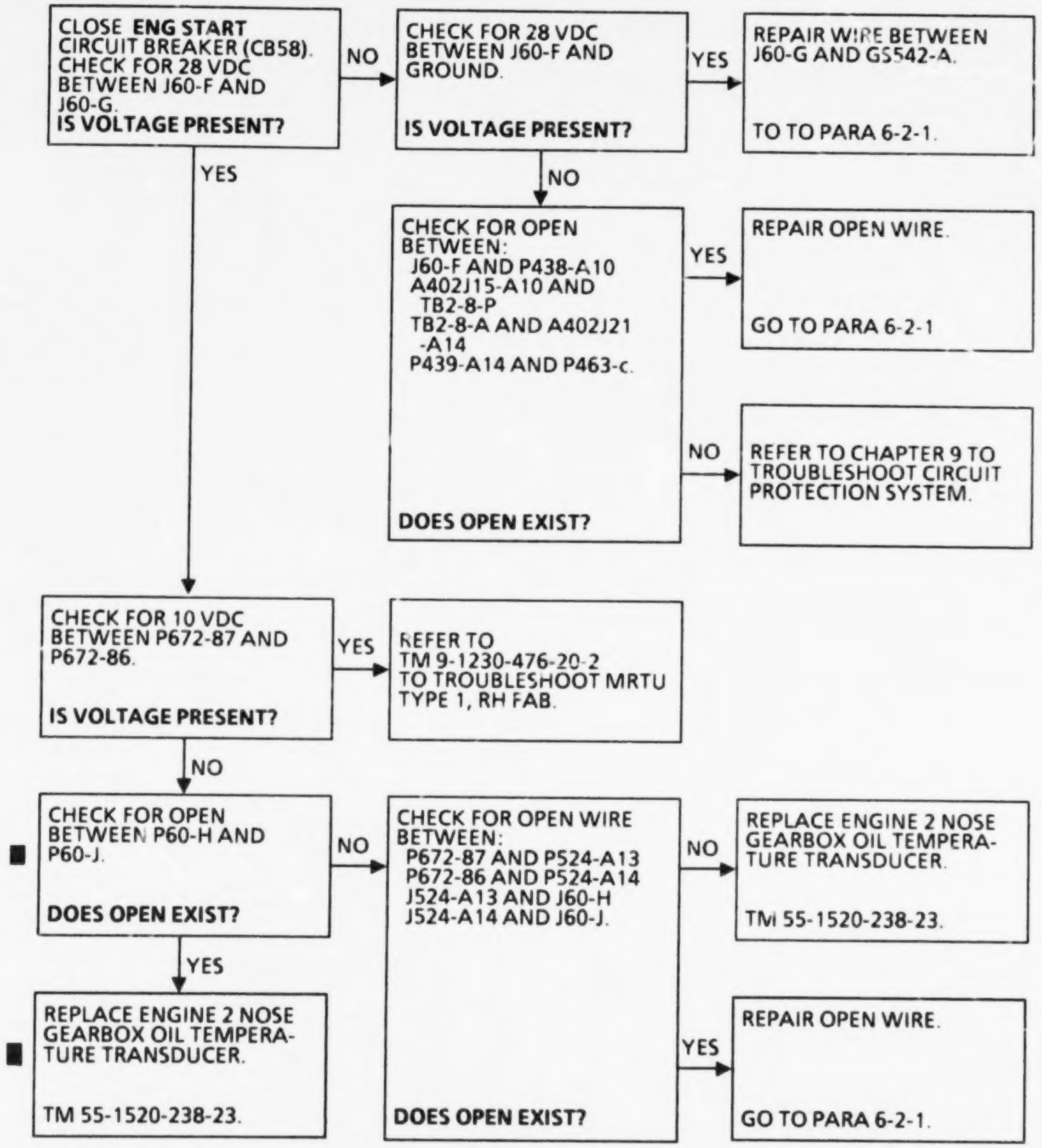
References: (para 6-2-8)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R200 panel removed
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CLOSE ENG START CIRCUIT BREAKER (CB58). CHECK FOR 28 VDC BETWEEN J60-F AND J60-G.
IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN J60-F AND GROUND.
IS VOLTAGE PRESENT?
YES
REPAIR WIRE BETWEEN J60-G AND GS542-A.
TO TO PARA 6-2-1.
NO
CHECK FOR OPEN BETWEEN:
J60-F AND P438-A10
A402J15-A10 AND TB2-8-P
TB2-8-A AND A402J21-A14
P439-A14 AND P463-c.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
YES
CHECK FOR 10 VDC BETWEEN P672-87 AND P672-86.
IS VOLTAGE PRESENT?
YES
REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE 1, RH FAB.
NO
CHECK FOR OPEN BETWEEN P60-H AND P60-J.
DOES OPEN EXIST?
NO
CHECK FOR OPEN WIRE BETWEEN:
P672-87 AND P524-A13
P672-86 AND P524-A14
J524-A13 AND J60-H
J524-A14 AND J60-J.
DOES OPEN EXIST?
NO
REPLACE ENGINE 2 NOSE GEARBOX OIL TEMPERATURE TRANSDUCER.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1.
YES
REPLACE ENGINE 2 NOSE GEARBOX OIL TEMPERATURE TRANSDUCER.
TM 55-1520-238-23.

END OF TASK

6-2-10. OIL PSI ACC PUMP INDICATOR - DOES NOT LIGHT WITH ELECTRICAL POWER APPLIED AND ALL POWER PLANTS OFF

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

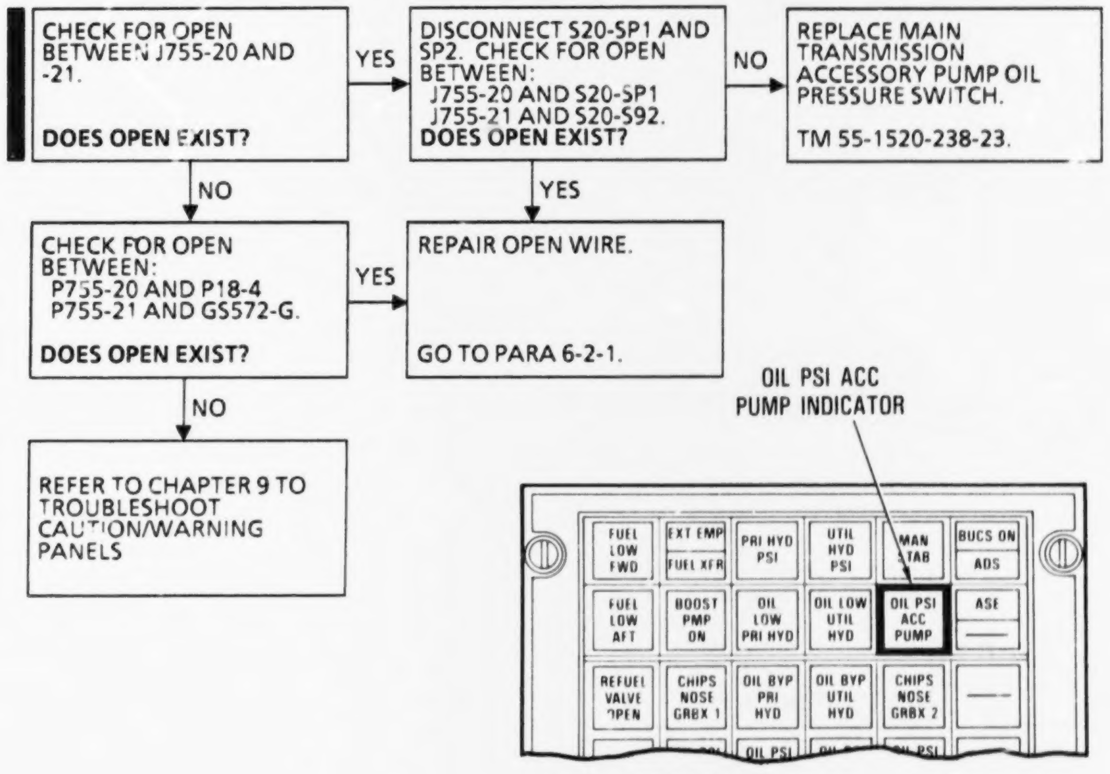
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 access panel opened

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR OPEN BETWEEN J755-20 AND -21. **DOES OPEN EXIST?**

DISCONNECT S20-SP1 AND SP2. CHECK FOR OPEN BETWEEN: J755-20 AND S20-SP1 J755-21 AND S20-S92. **DOES OPEN EXIST?**

REPLACE MAIN TRANSMISSION ACCESSORY PUMP OIL PRESSURE SWITCH. TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN: P755-20 AND P18-4 P755-21 AND GS572-G. **DOES OPEN EXIST?**

REPAIR OPEN WIRE. GO TO PARA 6-2-1.

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS

YES
NO
NO
YES
YES
NO
OIL PSI ACC PUMP INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
OIL PSI
OIL PSI

PILOT CAUTION/WARNING PANEL

MM04/1-951

END OF TASK

6-2-11. CHIPS MAIN XMSN INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

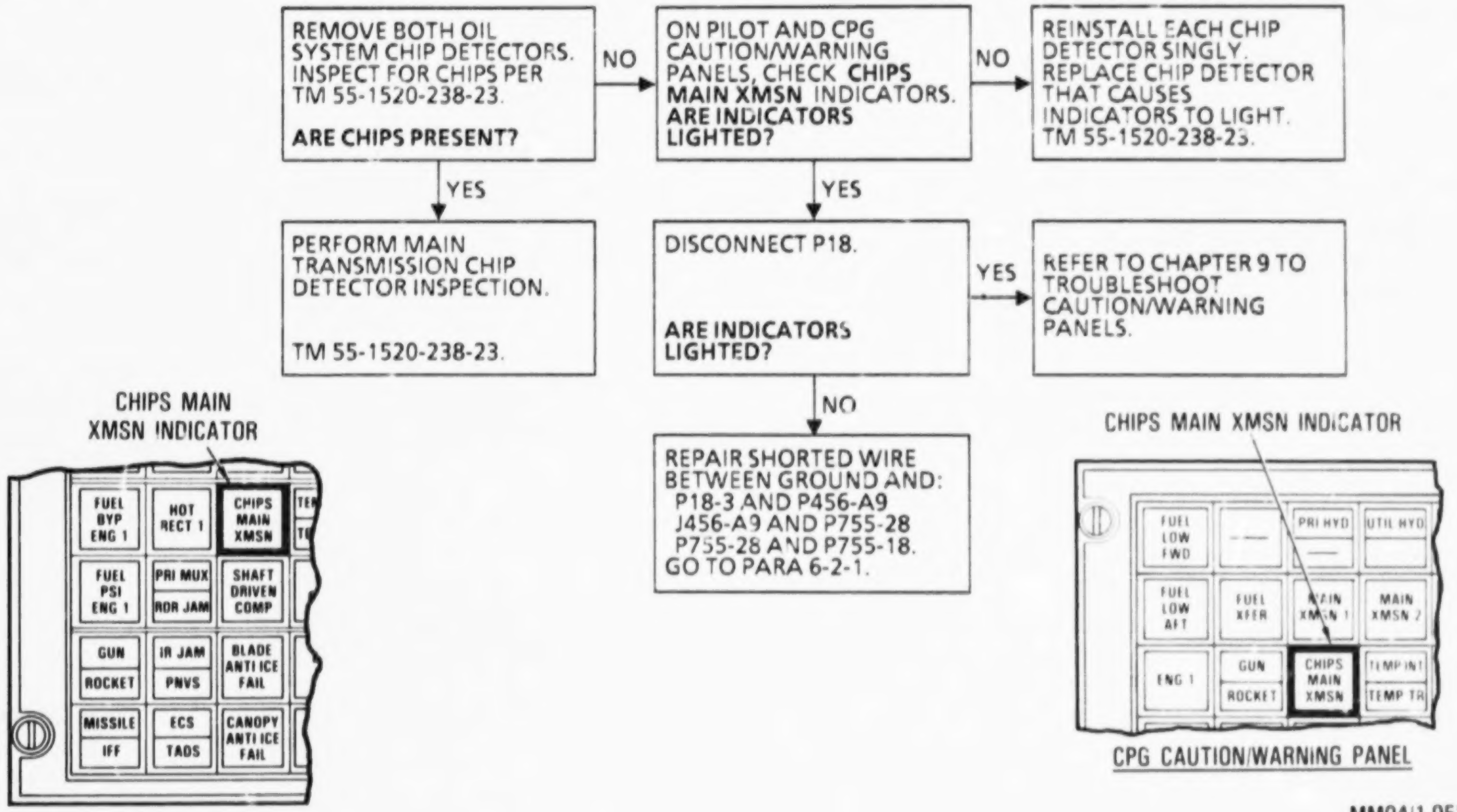
Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References: (para 6-2-10)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 and R200 access panels opened
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
Para 1-3-2	ICS connected



REMOVE BOTH OIL SYSTEM CHIP DETECTORS. INSPECT FOR CHIPS PER TM 55-1520-238-23. **ARE CHIPS PRESENT?**

ON PILOT AND CPG CAUTION/WARNING PANELS, CHECK **CHIPS MAIN XMSN** INDICATORS. **ARE INDICATORS LIGHTED?**

REINSTALL EACH CHIP DETECTOR SINGLY. REPLACE CHIP DETECTOR THAT CAUSES INDICATORS TO LIGHT. TM 55-1520-238-23.

PERFORM MAIN TRANSMISSION CHIP DETECTOR INSPECTION. TM 55-1520-238-23.

DISCONNECT P18. **ARE INDICATORS LIGHTED?**

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

REPAIR SHORTED WIRE BETWEEN GROUND AND: P18-3 AND P456-A9 J456-A9 AND P755-28 P755-28 AND P755-18. GO TO PARA 6-2-1.

NO
NO
YES
YES
YES
NO
CHIPS MAIN XMSN INDICATOR
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
CHIPS MAIN XMSN INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR

PILOT CAUTION/WARNING PANEL

CPG CAUTION/WARNING PANEL

MM04/1-952

END OF TASK

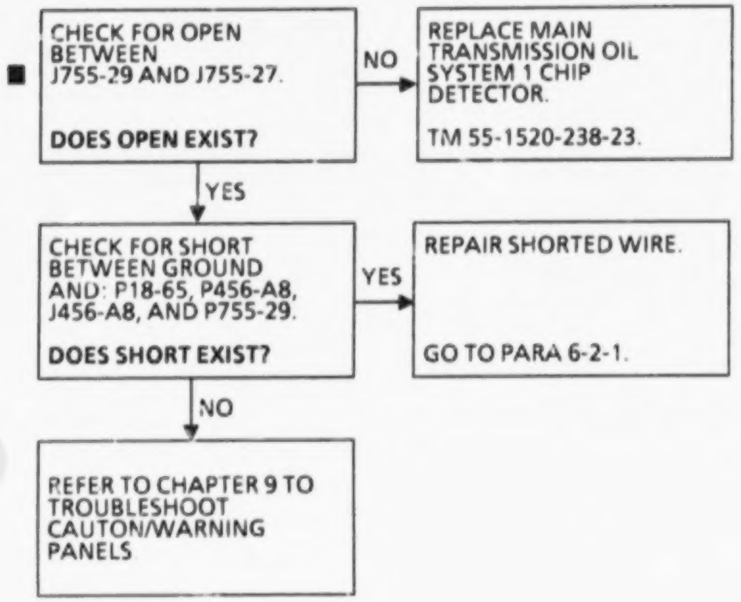
6-2-12. OIL HOT MAIN XMSN 1 INDICATOR - LIGHTS

Tools: (para 6-2-10)

Personnel Required: (para 6-2-10)

References: (para 6-2-10)

Equipment Conditions: (para 6-2-10)


■ CHECK FOR OPEN BETWEEN J755-29 AND J755-27.

DOES OPEN EXIST?

NO → REPLACE MAIN TRANSMISSION OIL SYSTEM 1 CHIP DETECTOR.

TM 55-1520-238-23.

YES ↓

CHECK FOR SHORT BETWEEN GROUND AND: P18-65, P456-A8, J456-A8, AND P755-29.

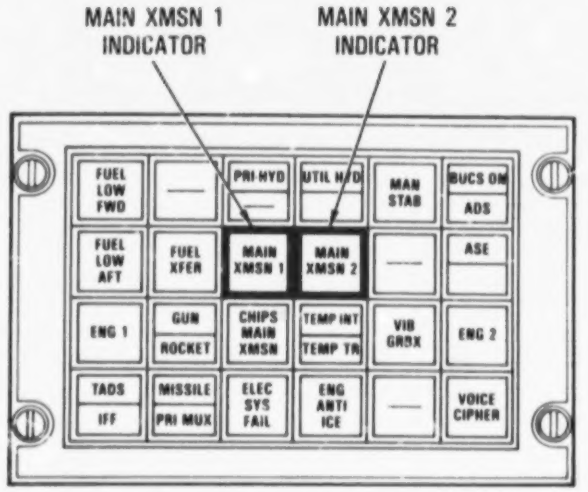
DOES SHORT EXIST?

YES → REPAIR SHORTED WIRE.

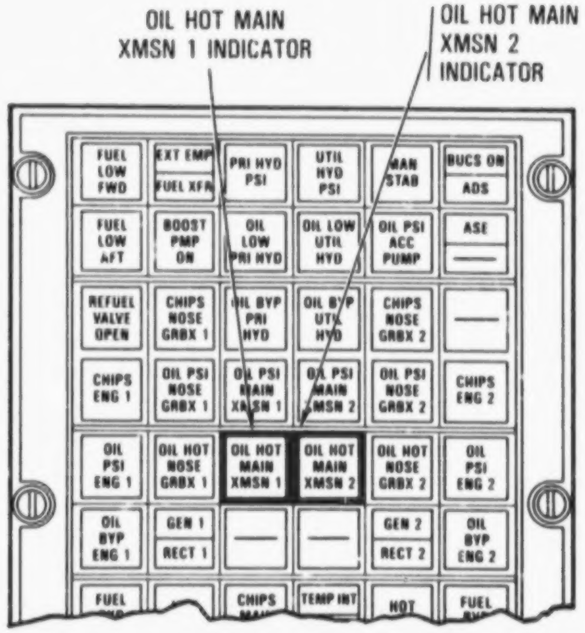
GO TO PARA 6-2-1.

NO ↓

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS


MAIN XMSN 1 INDICATOR
MAIN XMSN 2 INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

CPG CAUTION/WARNING PANEL


OIL HOT MAIN XMSN 1 INDICATOR
OIL HOT MAIN XMSN 2 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL
CHIPS
TEMP INT
HOT
FUEL

PILOT CAUTION/WARNING PANEL

MM04/1-953

END OF TASK

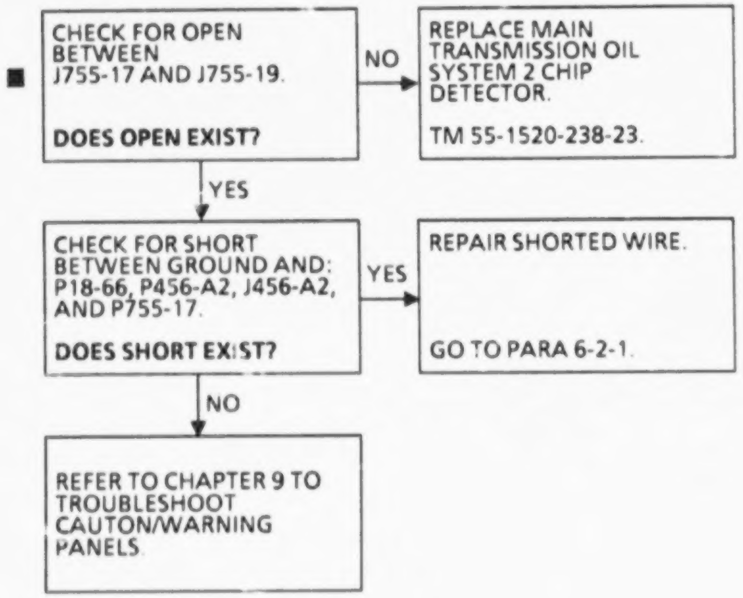
6-2-13. OIL HOT MAIN XMSN 2 INDICATOR - LIGHTS

Tools: (para 6-2-10)

Personnel Required: (para 6-2-10)

References: (para 6-2-10)

Equipment Conditions: (para 6-2-10)


■ CHECK FOR OPEN BETWEEN J755-17 AND J755-19.

DOES OPEN EXIST?

NO → REPLACE MAIN TRANSMISSION OIL SYSTEM 2 CHIP DETECTOR.

TM 55-1520-238-23.

YES ↓

CHECK FOR SHORT BETWEEN GROUND AND: P18-66, P456-A2, J456-A2, AND P755-17.

DOES SHORT EXIST?

YES → REPAIR SHORTED WIRE.

GO TO PARA 6-2-1.

NO ↓

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

END OF TASK

6-2-14. OIL PSI MAIN XMSN 1 INDICATOR - DOES NOT LIGHT WITH ELECTRICAL POWER APPLIED AND ALL POWER PLANTS OFF

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

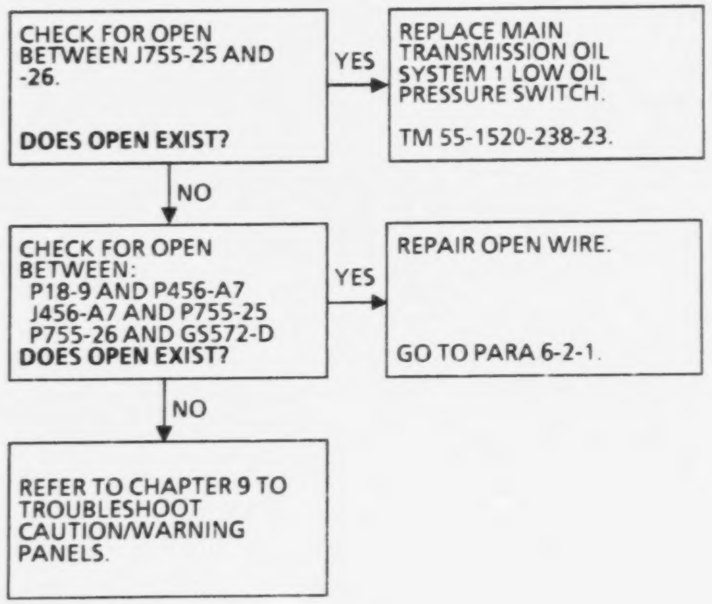
68F10 Aircraft Electrician
One person to assist

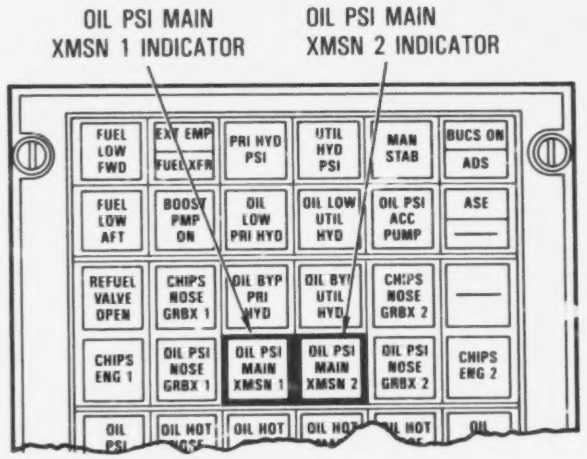
References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 access panel opened


CHECK FOR OPEN BETWEEN J755-25 AND -26.
DOES OPEN EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 LOW OIL PRESSURE SWITCH.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P18-9 AND P456-A7 J456-A7 AND P755-25 P755-26 AND GS572-D
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.


OIL PSI MAIN XMSN 1 INDICATOR
OIL PSI MAIN XMSN 2 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI
OIL HOT NOSE
OIL HOT
OIL HOT
OIL HOT
OIL

PILOT CAUTION/WARNING PANEL

MM04/1-954

END OF TASK

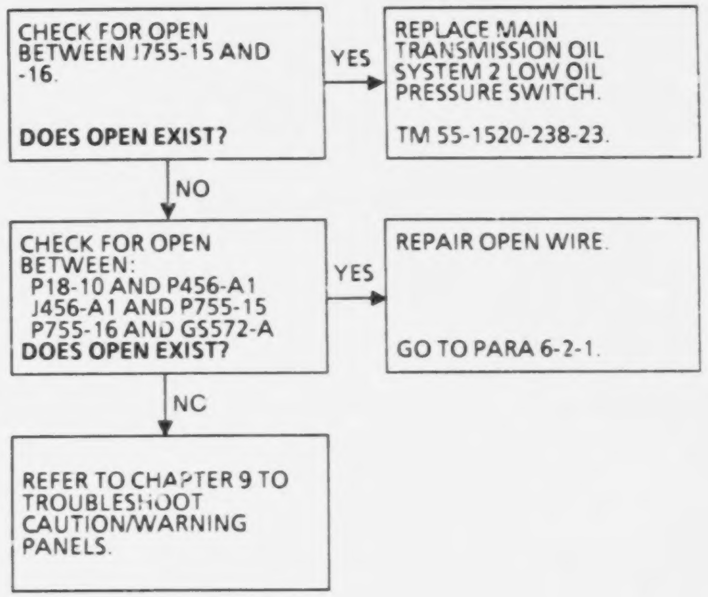
6-2-15. OIL PSI MAIN XMSN 2 INDICATOR - DOES NOT LIGHT WITH ELECTRICAL POWER APPLIED AND ALL POWER PLANTS OFF

Tools: (para 6-2-14)

Personnel Required: (para 6-2-14)

References: (para 6-2-14)

Equipment Conditions: (para 6-2-14)


CHECK FOR OPEN BETWEEN J755-15 AND -16.
DOES OPEN EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 LOW OIL PRESSURE SWITCH.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P18-10 AND P456-A1 J456-A1 AND P755-15 P755-16 AND GS572-A
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

END OF TASK

6-2-16. TEMP INT INDICATOR - LIGHTS

Tools: (para 6-2-14)

Personnel Required: (para 6-2-14)

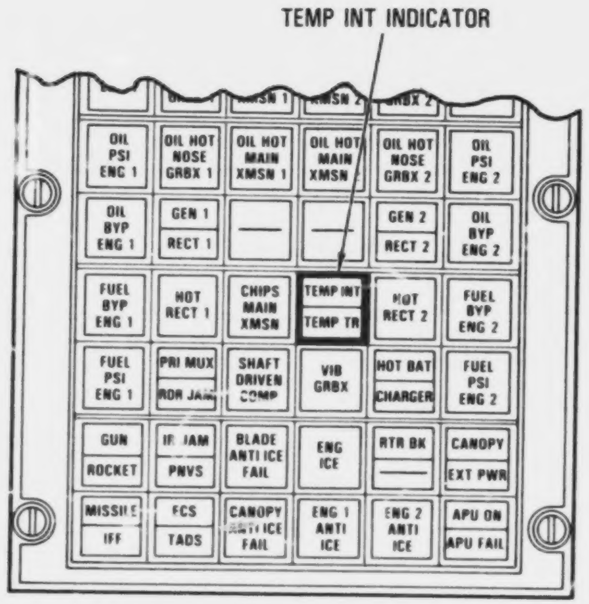
References: (para 6-2-14)

Equipment Conditions:

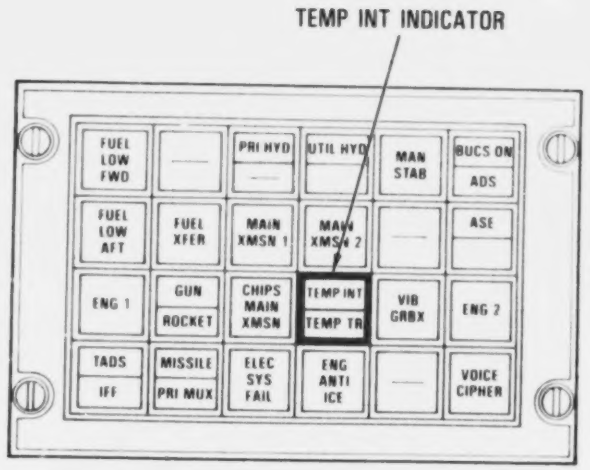
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R510 fairing open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

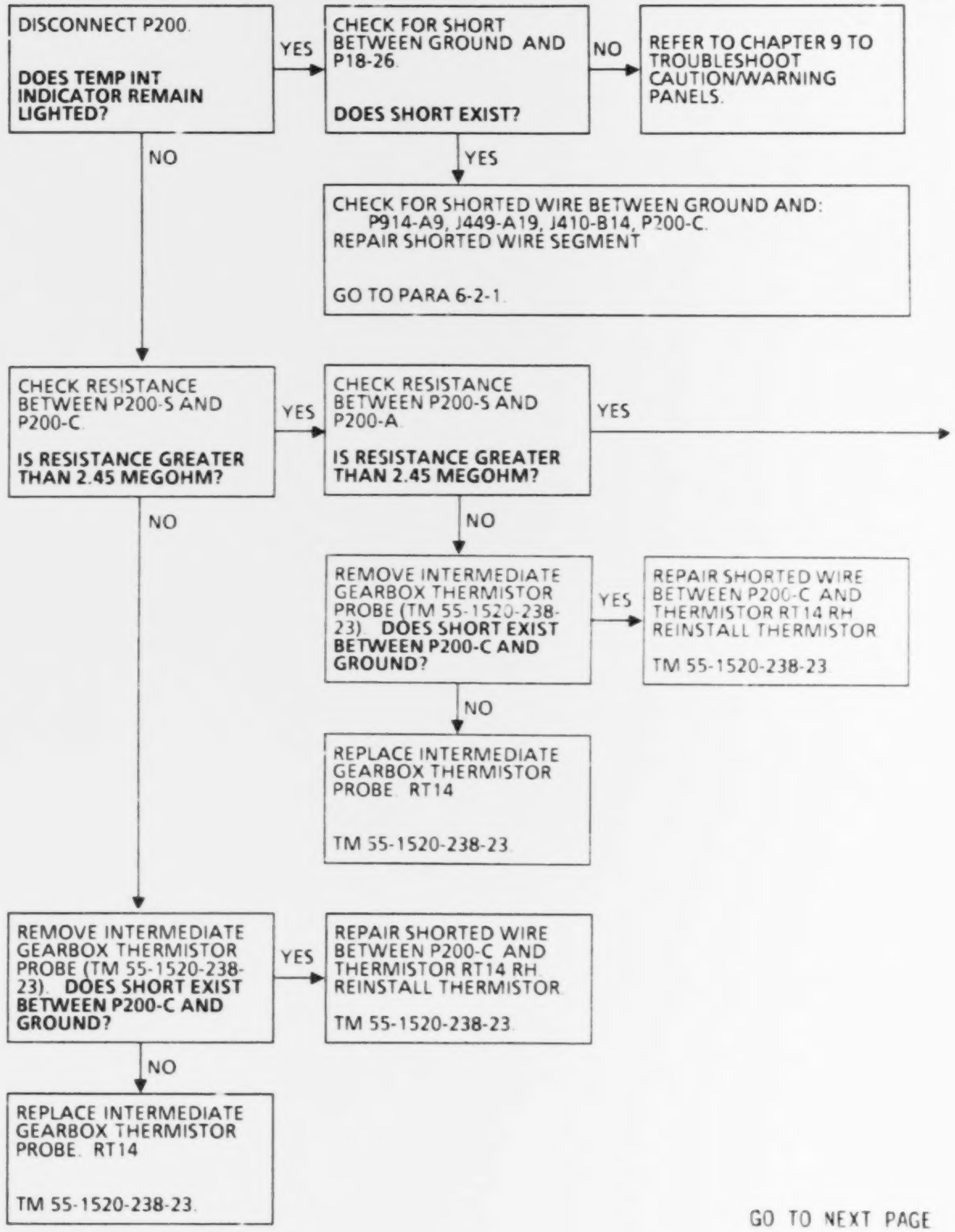

TEMP INT INDICATOR
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1 / RECT 1
GEN 2 / RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT / TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX / RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT / CHARGER
FUEL PSI ENG 2
GUN / ROCKET
IR JAM / PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY / EXT PWR
MISSILE / IFF
FCS / TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON / APU FAIL

PILOT CAUTION/WARNING PANEL


TEMP INT INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON / ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN / ROCKET
CHIPS MAIN XMSN
TEMP INT / TEMP TR
VIB GRBX
ENG 2
TADS / IFF
MISSILE / PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

CPG CAUTION/WARNING PANEL

MM04/1-955


DISCONNECT P200. DOES TEMP INT INDICATOR REMAIN LIGHTED?
YES
CHECK FOR SHORT BETWEEN GROUND AND P18-26. DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
CHECK FOR SHORTED WIRE BETWEEN GROUND AND: P914-A9, J449-A19, J410-B14, P200-C. REPAIR SHORTED WIRE SEGMENT. GO TO PARA 6-2-1.
NO
CHECK RESISTANCE BETWEEN P200-S AND P200-C. IS RESISTANCE GREATER THAN 2.45 MEGOHM?
YES
CHECK RESISTANCE BETWEEN P200-S AND P200-A. IS RESISTANCE GREATER THAN 2.45 MEGOHM?
YES
NO
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P200-C AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-C AND THERMISTOR RT14 RH. REINSTALL THERMISTOR. TM 55-1520-238-23
NO
REPLACE INTERMEDIATE GEARBOX THERMISTOR PROBE RT14. TM 55-1520-238-23.
NO
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P200-C AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-C AND THERMISTOR RT14 RH. REINSTALL THERMISTOR. TM 55-1520-238-23.
NO
REPLACE INTERMEDIATE GEARBOX THERMISTOR PROBE. RT14. TM 55-1520-238-23.

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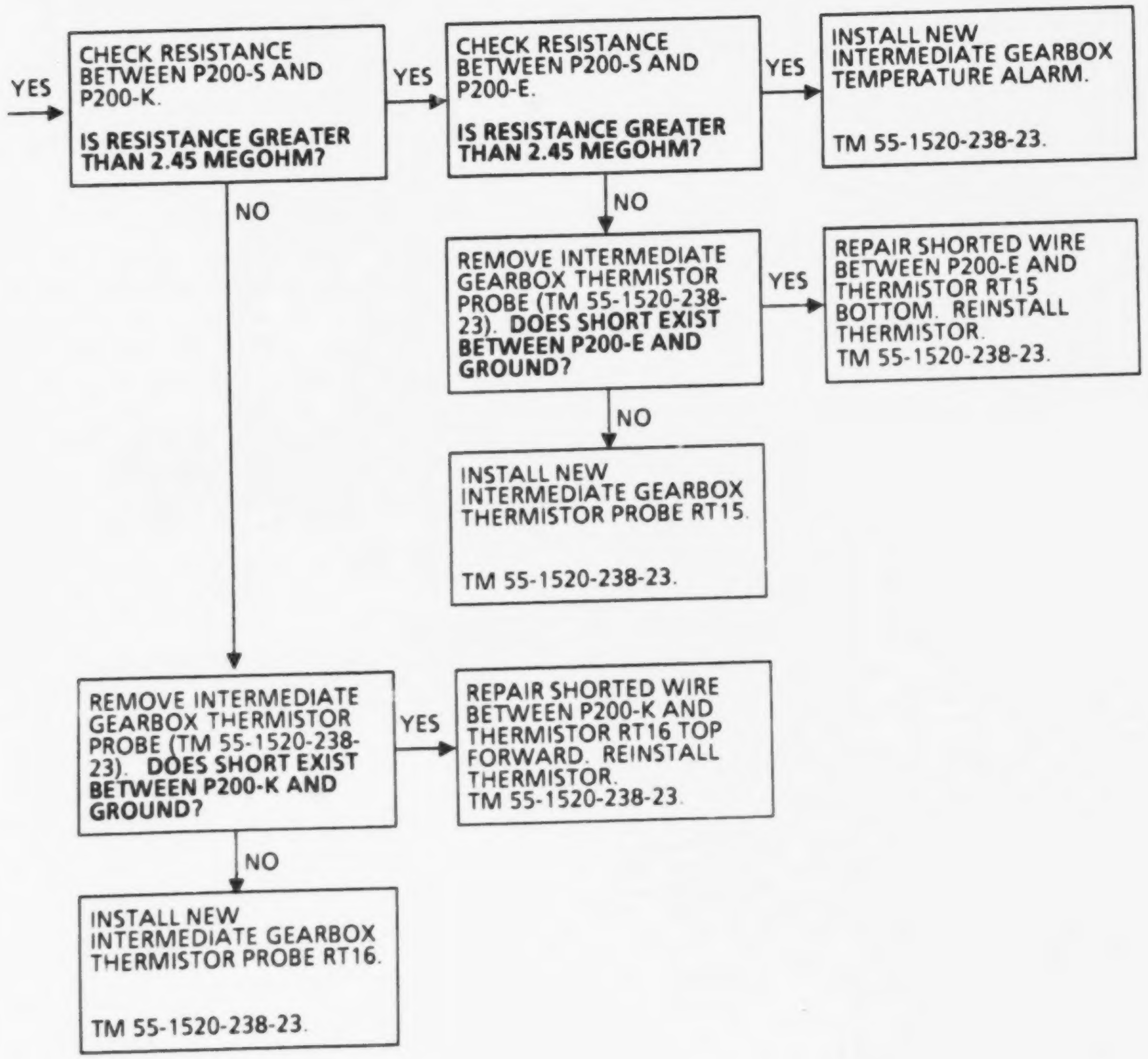
6-2-16. TEMP INT INDICATOR - LIGHTS (cont)


YES
CHECK RESISTANCE BETWEEN P200-S AND P200-K.
IS RESISTANCE GREATER THAN 2.45 MEGOHM?
YES
CHECK RESISTANCE BETWEEN P200-S AND P200-E.
IS RESISTANCE GREATER THAN 2.45 MEGOHM?
YES
INSTALL NEW INTERMEDIATE GEARBOX TEMPERATURE ALARM.
TM 55-1520-238-23.
NO
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P200-E AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-E AND THERMISTOR RT15 BOTTOM. REINSTALL THERMISTOR.
TM 55-1520-238-23.
NO
INSTALL NEW INTERMEDIATE GEARBOX THERMISTOR PROBE RT15.
TM 55-1520-238-23.
NO
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P200-K AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-K AND THERMISTOR RT16 TOP FORWARD. REINSTALL THERMISTOR.
TM 55-1520-238-23.
NO
INSTALL NEW INTERMEDIATE GEARBOX THERMISTOR PROBE RT16.
TM 55-1520-238-23.

END OF TASK

6-2-17. TEMP TR INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

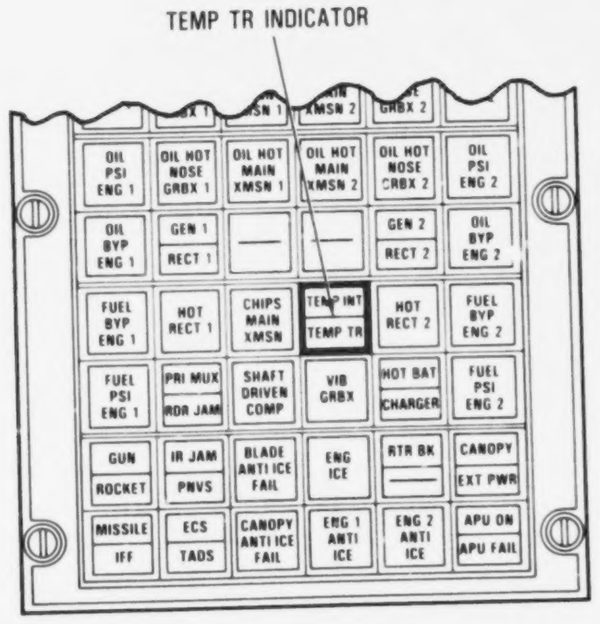
TM 55-1520-238-23

Equipment Conditions:

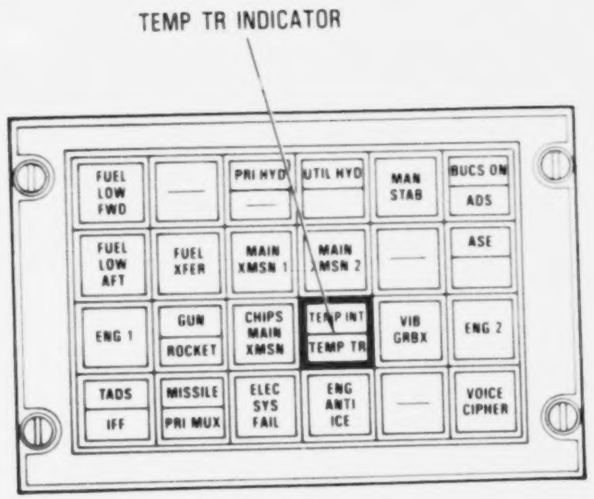
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R510 fairing open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


TEMP TR INDICATOR
GRBX 1
XMSN 1
MAIN XMSN 2
GRBX 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL


TEMP TR INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

CPG CAUTION/WARNING PANEL

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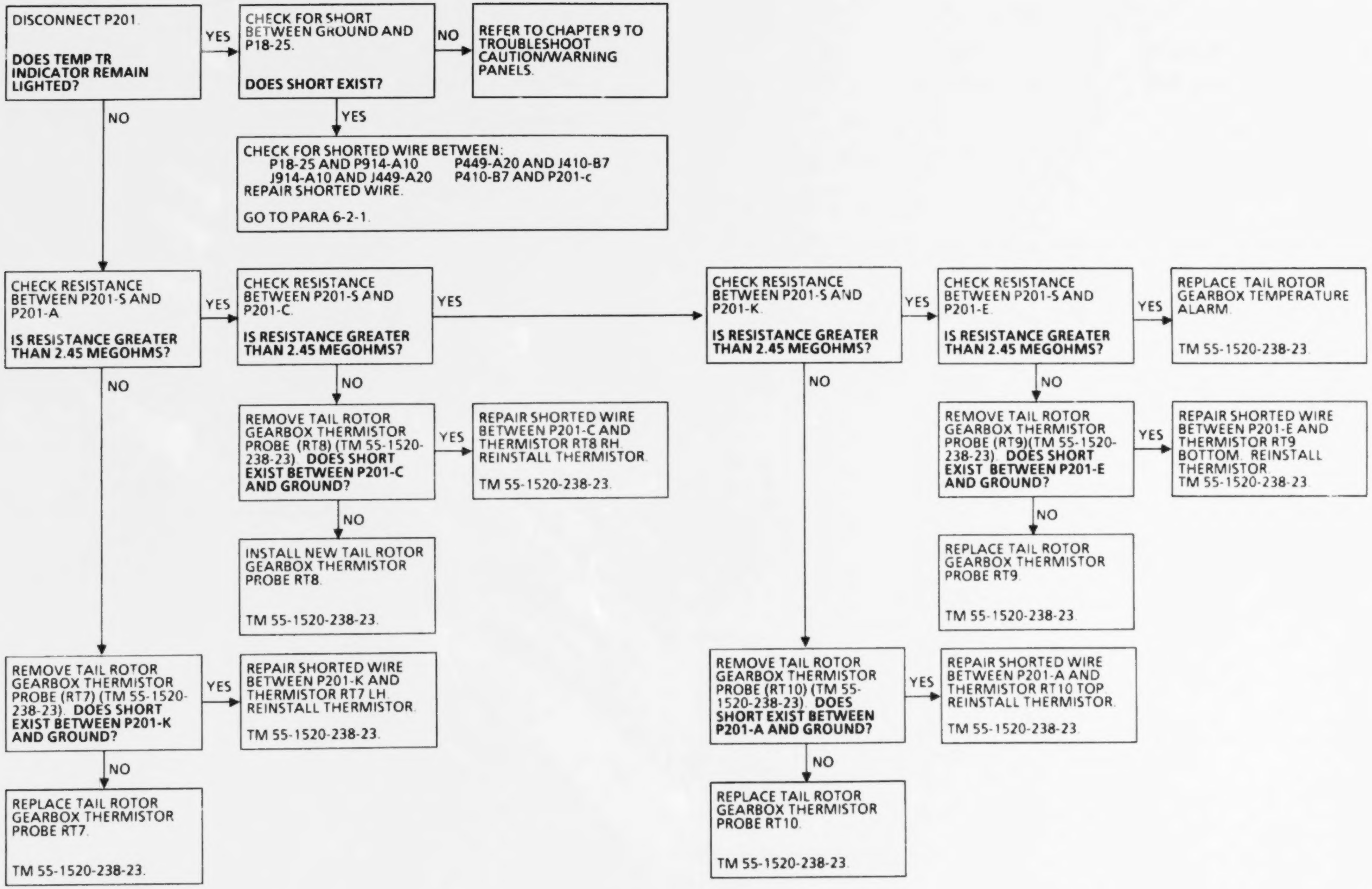
6-2-17. TEMP TR INDICATOR - LIGHTS (cont)


DISCONNECT P201. DOES TEMP TR INDICATOR REMAIN LIGHTED?
YES
CHECK FOR SHORT BETWEEN GROUND AND P18-25. DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
CHECK FOR SHORTED WIRE BETWEEN: P18-25 AND P914-A10 P449-A20 AND J410-B7 J914-A10 AND J449-A20 P410-B7 AND P201-c REPAIR SHORTED WIRE. GO TO PARA 6-2-1.
NO
CHECK RESISTANCE BETWEEN P201-S AND P201-A. IS RESISTANCE GREATER THAN 2.45 MEGOHMS?
YES
CHECK RESISTANCE BETWEEN P201-S AND P201-C. IS RESISTANCE GREATER THAN 2.45 MEGOHMS?
YES
CHECK RESISTANCE BETWEEN P201-S AND P201-K. IS RESISTANCE GREATER THAN 2.45 MEGOHMS?
YES
CHECK RESISTANCE BETWEEN P201-S AND P201-E. IS RESISTANCE GREATER THAN 2.45 MEGOHMS?
YES
REPLACE TAIL ROTOR GEARBOX TEMPERATURE ALARM. TM 55-1520-238-23.
NO
REMOVE TAIL ROTOR GEARBOX THERMISTOR PROBE (RT8) (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P201-C AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P201-C AND THERMISTOR RT8 RH. REINSTALL THERMISTOR. TM 55-1520-238-23.
NO
INSTALL NEW TAIL ROTOR GEARBOX THERMISTOR PROBE RT8. TM 55-1520-238-23.
NO
NO
REMOVE TAIL ROTOR GEARBOX THERMISTOR PROBE (RT9)(TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P201-E AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P201-E AND THERMISTOR RT9 BOTTOM. REINSTALL THERMISTOR. TM 55-1520-238-23.
NO
REPLACE TAIL ROTOR GEARBOX THERMISTOR PROBE RT9. TM 55-1520-238-23.
NO
REMOVE TAIL ROTOR GEARBOX THERMISTOR PROBE (RT7) (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P201-K AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P201-K AND THERMISTOR RT7 LH. REINSTALL THERMISTOR. TM 55-1520-238-23.
NO
REPLACE TAIL ROTOR GEARBOX THERMISTOR PROBE RT7. TM 55-1520-238-23.
REMOVE TAIL ROTOR GEARBOX THERMISTOR PROBE (RT10) (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P201-A AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P201-A AND THERMISTOR RT10 TOP. REINSTALL THERMISTOR. TM 55-1520-238-23.
NO
REPLACE TAIL ROTOR GEARBOX THERMISTOR PROBE RT10. TM 55-1520-238-23.

END OF TASK

6-2-18. OIL HOT NOSE GRBX 1 INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10	Aircraft Electrician One person to assist

References:

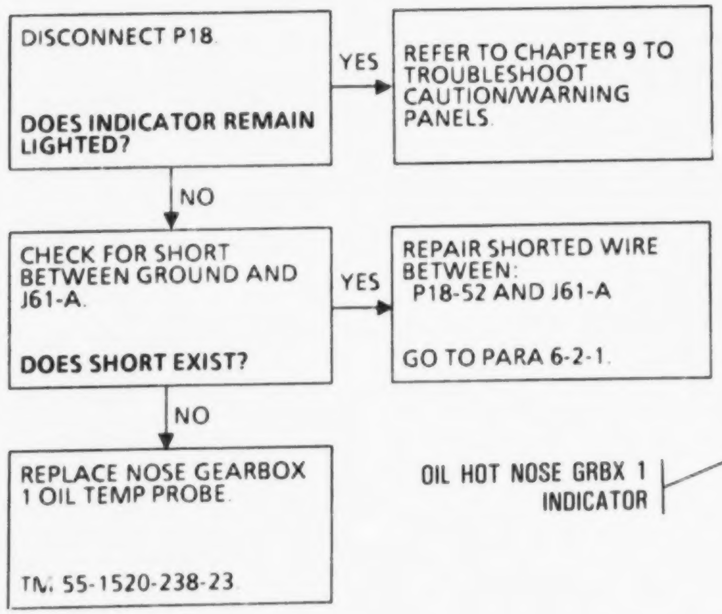
TM 55-1520-238-23

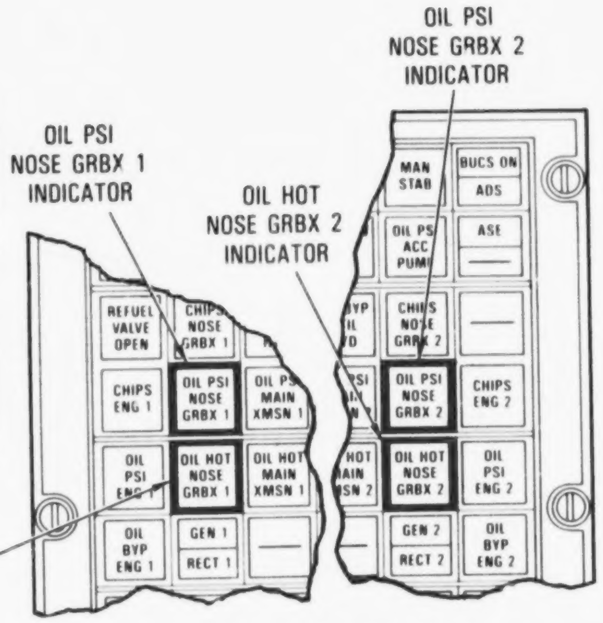
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 access door open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


DISCONNECT P18.
DOES INDICATOR REMAIN LIGHTED?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
NO
CHECK FOR SHORT BETWEEN GROUND AND J61-A.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN: P18-52 AND J61-A
GO TO PARA 6-2-1.
NO
REPLACE NOSE GEARBOX 1 OIL TEMP PROBE.
TM 55-1520-238-23.


OIL PSI NOSE GRBX 2 INDICATOR
OIL PSI NOSE GRBX 1 INDICATOR
OIL HOT NOSE GRBX 2 INDICATOR
OIL HOT NOSE GRBX 1 INDICATOR
MAN STAB
BUCS ON
ADS
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2

PILOT CAUTION/WARNING PANEL

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END OF TASK

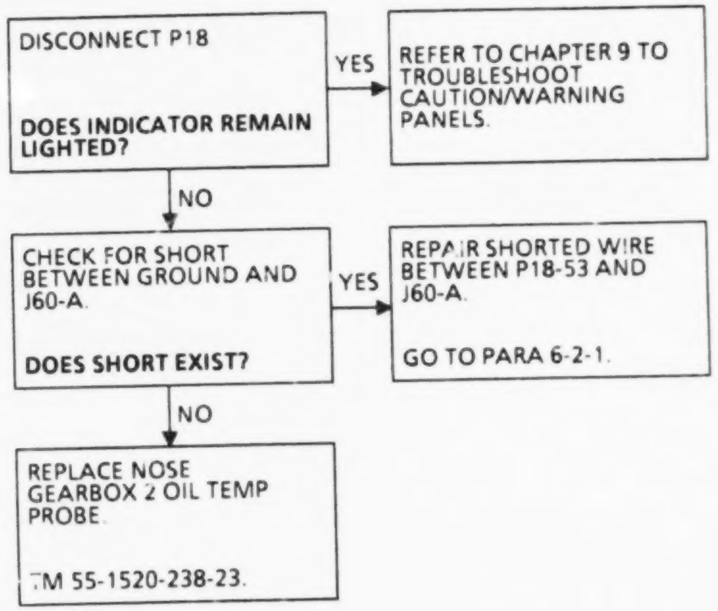
6-2-19. OIL HOT NOSE GRBX 2 INDICATOR - LIGHTS

Tools: (para 6-2-18)

Personnel Required: (para 6-2-18)

References: (para 6-2-18)

Equipment Conditions: (para 6-2-18)


DISCONNECT P18
DOES INDICATOR REMAIN LIGHTED?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
NO
CHECK FOR SHORT BETWEEN GROUND AND J60-A.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN P18-53 AND J60-A.
GO TO PARA 6-2-1.
NO
REPLACE NOSE GEARBOX 2 OIL TEMP PROBE.
TM 55-1520-238-23.

END OF TASK

6-2-20. OIL PSI NOSE GRBX 1 INDICATOR - DOES NOT LIGHT WITH ELECTRICAL POWER APPLIED AND ALL POWER PLANTS OFF

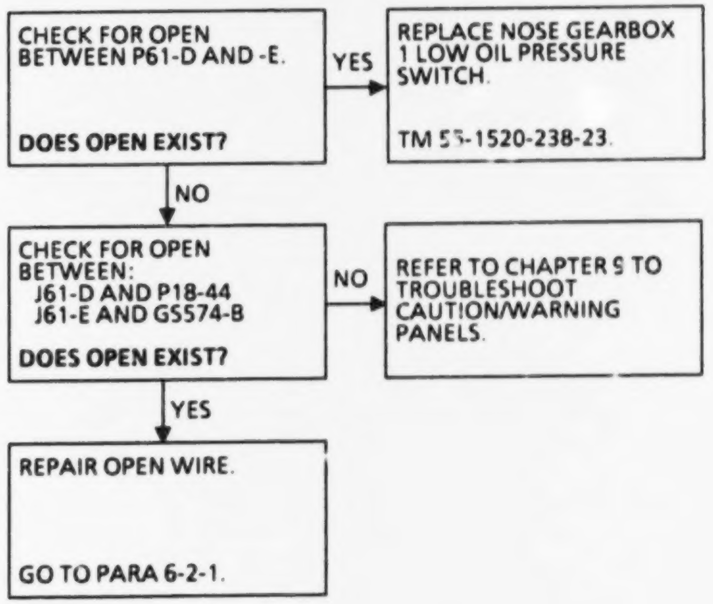
Tools: (para 6-2-18)

Personnel Required: (para 6-2-18)

References: (para 6-2-18)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 panel open


CHECK FOR OPEN BETWEEN P61-D AND -E.
DOES OPEN EXIST?
YES
REPLACE NOSE GEARBOX 1 LOW OIL PRESSURE SWITCH.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN:
J61-D AND P18-44
J61-E AND GS574-B
DOES OPEN EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1.

END OF TASK

6-2-21. OIL PSI NOSE GRBX 2 INDICATOR - DOES NOT LIGHT WITH ELECTRICAL POWER APPLIED AND ALL POWER PLANTS OFF

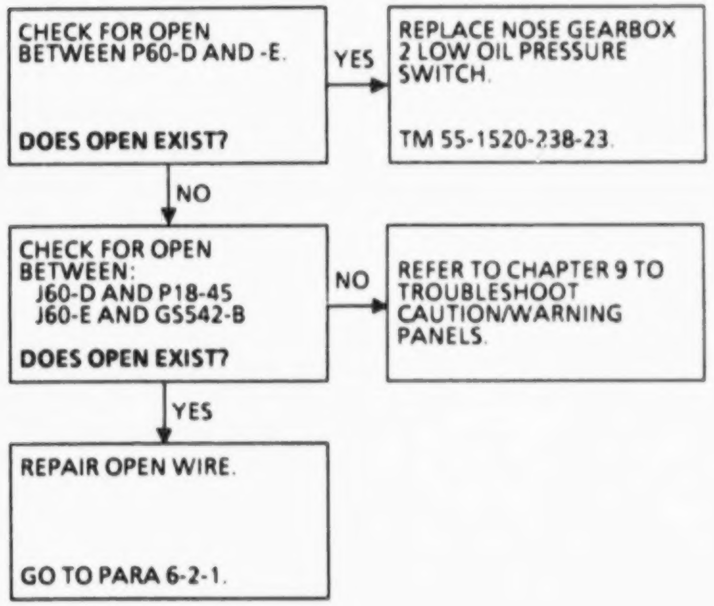
Tools: (para 6-2-18)

Personnel Required: (para 6-2-18)

References: (para 6-2-18)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R200 access panel open


CHECK FOR OPEN BETWEEN P60-D AND -E.
DOES OPEN EXIST?
YES
REPLACE NOSE GEARBOX 2 LOW OIL PRESSURE SWITCH.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN:
J60-D AND P18-45
J60-E AND GS542-B
DOES OPEN EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR OPEN WIRE.
GO TO PARA 6-2-1.

END OF TASK

6-2-22. CHIPS NOSE GRBX 1 INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

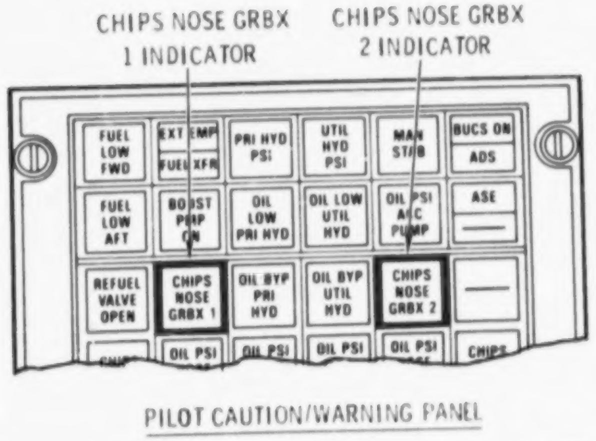
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 access panel open
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

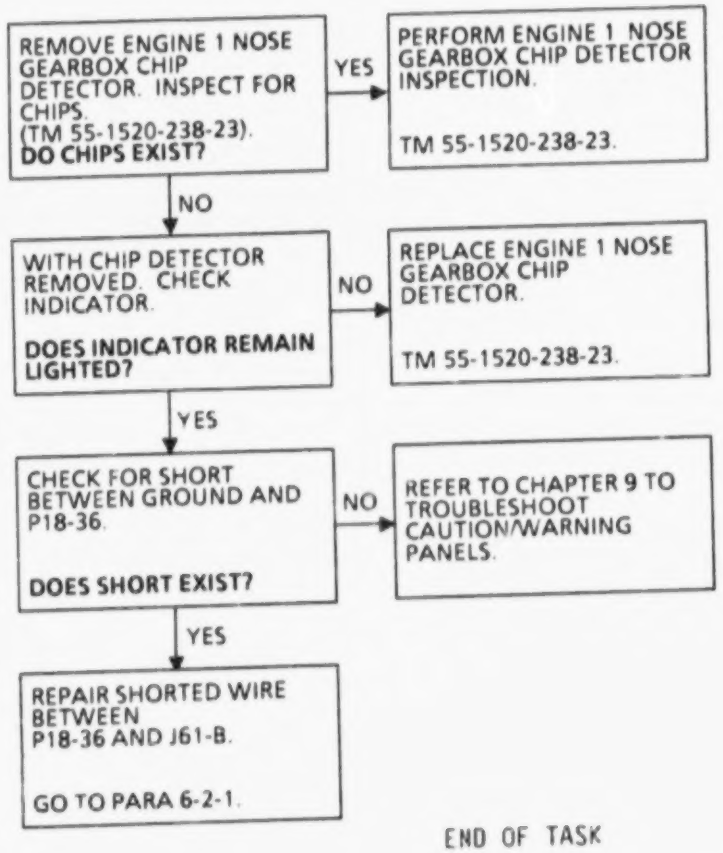
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHIPS NOSE GRBX 1 INDICATOR
CHIPS NOSE GRBX 2 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
OIL PSI
CHIPS

PILOT CAUTION/WARNING PANEL

MM04/1-958


YES
NO
NO
YES
NO
YES

REMOVE ENGINE 1 NOSE GEARBOX CHIP DETECTOR. INSPECT FOR CHIPS. (TM 55-1520-238-23). **DO CHIPS EXIST?**

PERFORM ENGINE 1 NOSE GEARBOX CHIP DETECTOR INSPECTION. TM 55-1520-238-23.

WITH CHIP DETECTOR REMOVED. CHECK INDICATOR. **DOES INDICATOR REMAIN LIGHTED?**

REPLACE ENGINE 1 NOSE GEARBOX CHIP DETECTOR. TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN GROUND AND P18-36. **DOES SHORT EXIST?**

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

REPAIR SHORTED WIRE BETWEEN P18-36 AND J61-B. GO TO PARA 6-2-1.

END OF TASK

6-2-23. CHIPS NOSE GRBX 2 INDICATOR - LIGHTS

Tools: (para 6-2-22)

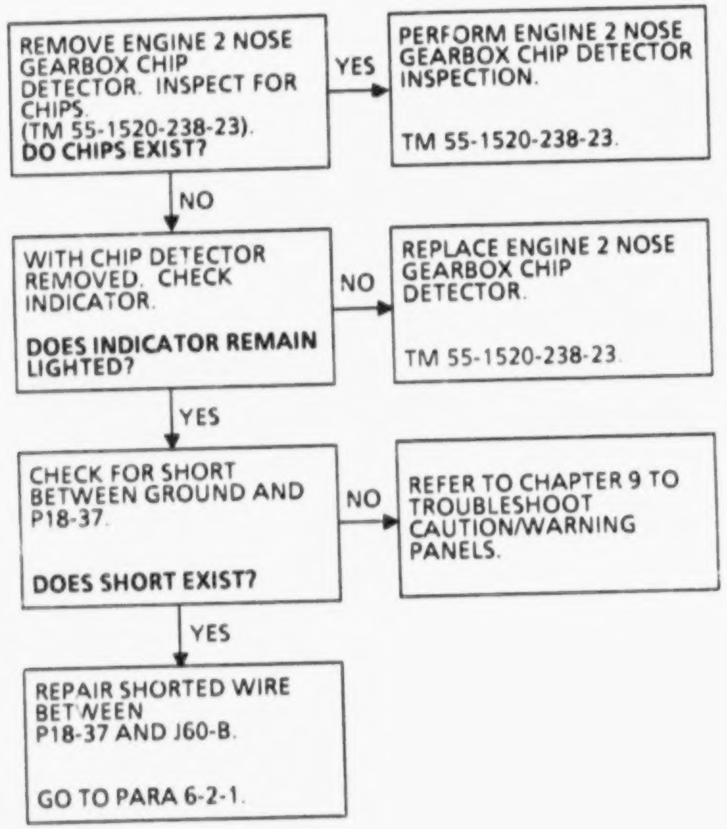
Personnel Required: (para 6-2-22)

References: (para 6-2-22)

Equipment Conditions: (para 6-2-22)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


YES
NO
NO
YES
NO
YES

REMOVE ENGINE 2 NOSE GEARBOX CHIP DETECTOR. INSPECT FOR CHIPS. (TM 55-1520-238-23). **DO CHIPS EXIST?**

PERFORM ENGINE 2 NOSE GEARBOX CHIP DETECTOR INSPECTION. TM 55-1520-238-23.

WITH CHIP DETECTOR REMOVED. CHECK INDICATOR. **DOES INDICATOR REMAIN LIGHTED?**

REPLACE ENGINE 2 NOSE GEARBOX CHIP DETECTOR. TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN GROUND AND P18-37. **DOES SHORT EXIST?**

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

REPAIR SHORTED WIRE BETWEEN P18-37 AND J60-B. GO TO PARA 6-2-1.

END OF TASK

6-2-24. PILOT LOW RPM ROTOR INDICATOR - DOES NOT LIGHT WITH ELECTRICAL POWER APPLIED AND ALL POWER PLANTS OFF

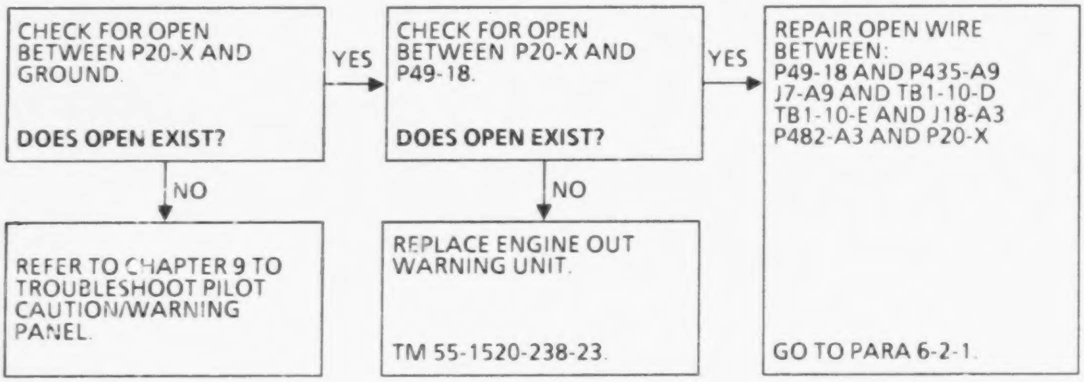
Tools: (para 6-2-22)

Personnel Required: (para 6-2-22)

References: (para 6-2-22)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



CHECK FOR OPEN BETWEEN P20-X AND GROUND.

DOES OPEN EXIST?

YES

CHECK FOR OPEN BETWEEN P20-X AND P49-18.

DOES OPEN EXIST?

YES

REPAIR OPEN WIRE BETWEEN:
P49-18 AND P435-A9
J7-A9 AND TB1-10-D
TB1-10-E AND J18-A3
P482-A3 AND P20-X

GO TO PARA 6-2-1.

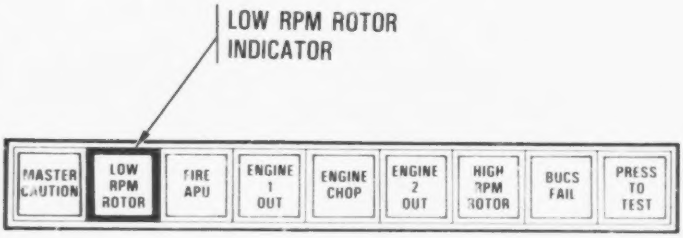
NO

REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CAUTION/WARNING PANEL.

NO

REPLACE ENGINE OUT WARNING UNIT.

TM 55-1520-238-23.


LOW RPM ROTOR INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL
(TYPICAL)

MM04/1-959

END OF TASK

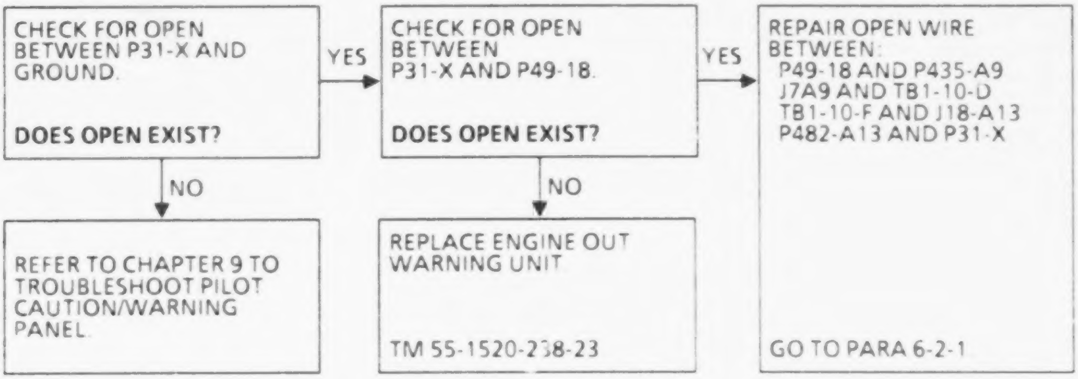
6-2-25. CPG LOW RPM ROTOR INDICATOR - DOES NOT LIGHT WITH ELECTRICAL POWER APPLIED AND ALL POWER PLANTS OFF

Tools: (para 6-2-22)

References: (para 6-2-22)

Personnel Required: (para 6-2-22)

Equipment Conditions: (para 6-2-24)



CHECK FOR OPEN BETWEEN P31-X AND GROUND.

DOES OPEN EXIST?

CHECK FOR OPEN BETWEEN P31-X AND P49-18.

DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
P49-18 AND P435-A9
J7A9 AND TB1-10-D
TB1-10-F AND J18-A13
P482-A13 AND P31-X

GO TO PARA 6-2-1

REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CAUTION/WARNING PANEL.

REPLACE ENGINE OUT WARNING UNIT

TM 55-1520-238-23

END OF TASK

6-2-26. HIGH RPM ROTOR INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician
One person to assist

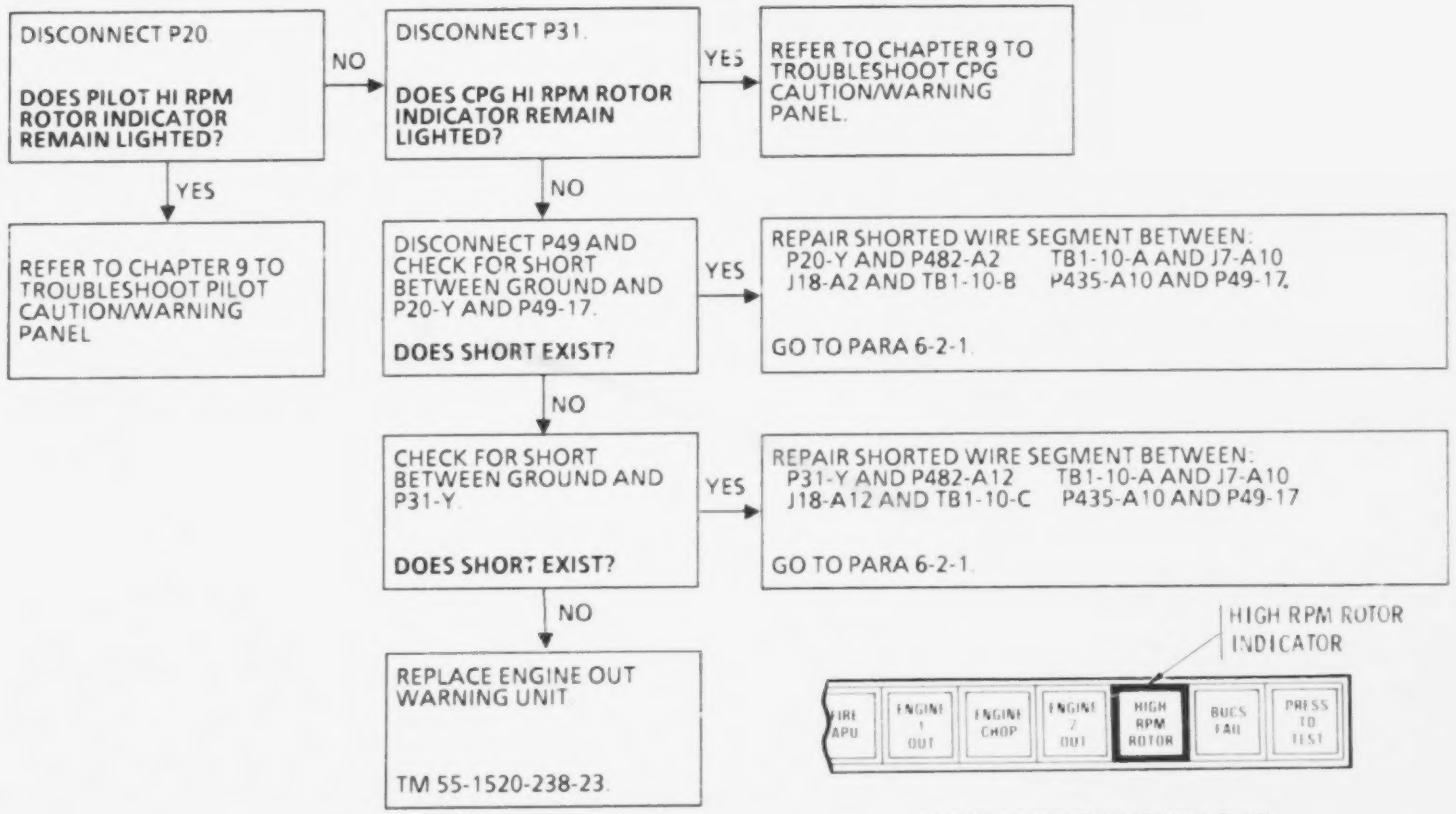
References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L140 access fairing open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

REFER TO VOLTAGE WARNING


DISCONNECT P20. DOES PILOT HI RPM ROTOR INDICATOR REMAIN LIGHTED?
NO
DISCONNECT P31. DOES CPG HI RPM ROTOR INDICATOR REMAIN LIGHTED?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CPG CAUTION/WARNING PANEL.
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CAUTION/WARNING PANEL.
NO
DISCONNECT P49 AND CHECK FOR SHORT BETWEEN GROUND AND P20-Y AND P49-17. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE SEGMENT BETWEEN: P20-Y AND P482-A2 TB1-10-A AND J7-A10 J18-A2 AND TB1-10-B P435-A10 AND P49-17. GO TO PARA 6-2-1.
NO
CHECK FOR SHORT BETWEEN GROUND AND P31-Y. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE SEGMENT BETWEEN: P31-Y AND P482-A12 TB1-10-A AND J7-A10 J18-A12 AND TB1-10-C P435-A10 AND P49-17 GO TO PARA 6-2-1.
NO
REPLACE ENGINE OUT WARNING UNIT. TM 55-1520-238-23.
HIGH RPM ROTOR INDICATOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL
(TYPICAL)

END OF TASK

MM04/1-960

6-2-27. ENG CUT CIRCUIT BREAKER - DOES NOT STAY CLOSED

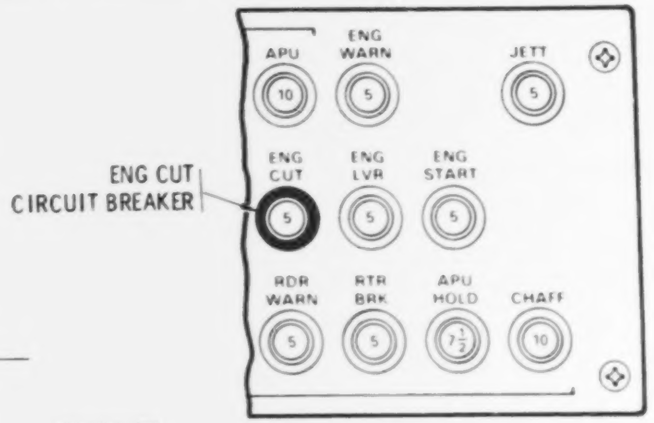
Tools: (para 6-2-26)

Personnel Required: (para 6-2-26)

References: (para 6-2-26)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed

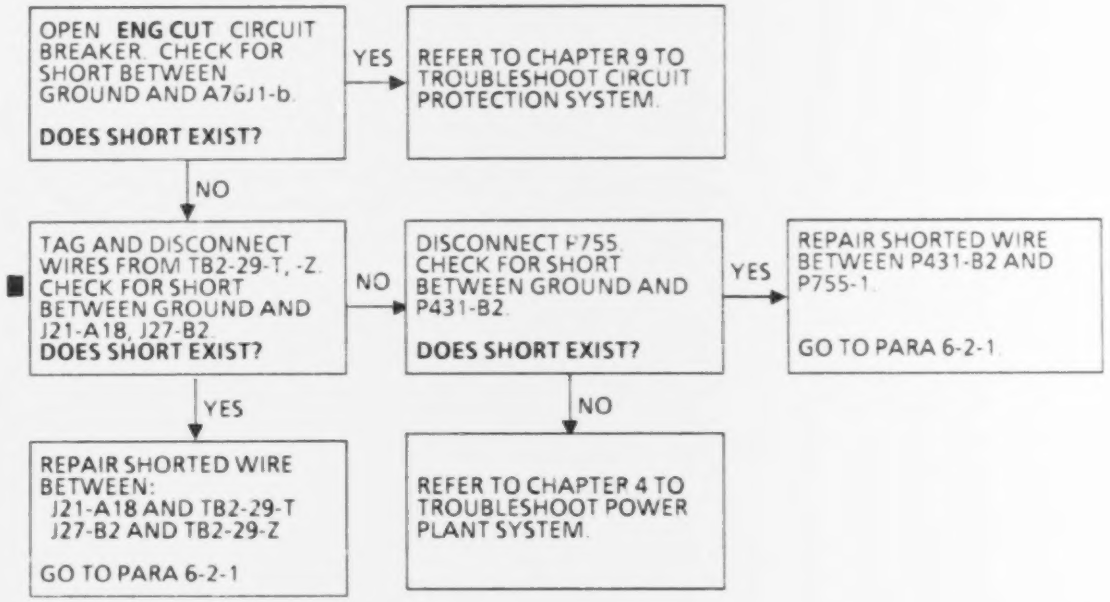

ENG CUT CIRCUIT BREAKER
APU
10
ENG WARN
5
JETT
5
ENG CUT
5
ENG LVR
5
ENG START
5
RDR WARN
5
RTR BRK
5
APU HOLD
7 1/2
CHAFF
10

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-961A

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OPEN ENG CUT CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND A76J1-b. DOES SHORT EXIST?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
NO
TAG AND DISCONNECT WIRES FROM TB2-29-T, -Z. CHECK FOR SHORT BETWEEN GROUND AND J21-A18, J27-B2. DOES SHORT EXIST?
NO
DISCONNECT P755. CHECK FOR SHORT BETWEEN GROUND AND P431-B2. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN P431-B2 AND P755-1. GO TO PARA 6-2-1.
YES
REPAIR SHORTED WIRE BETWEEN: J21-A18 AND TB2-29-T J27-B2 AND TB2-29-Z GO TO PARA 6-2-1
NO
REFER TO CHAPTER 4 TO TROUBLESHOOT POWER PLANT SYSTEM.

END OF TASK

6-2-28. VIB GRBX INDICATOR - LIGHTS

Tools: (para 6-2-26)

Personnel Required: (para 6-2-26)

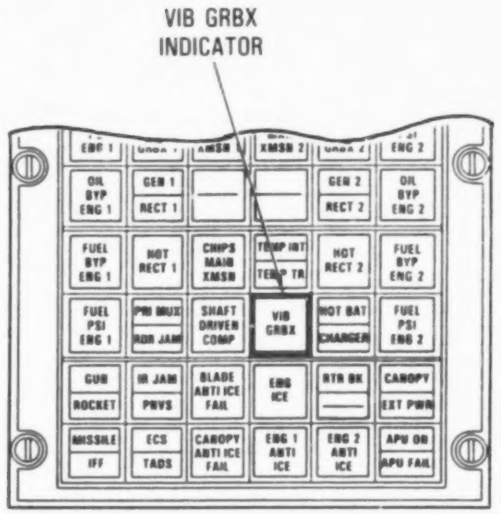
References: (para 6-2-26)

Equipment Conditions:

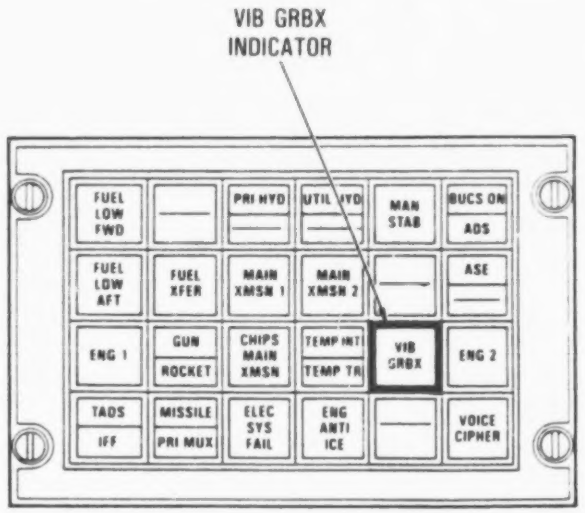
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

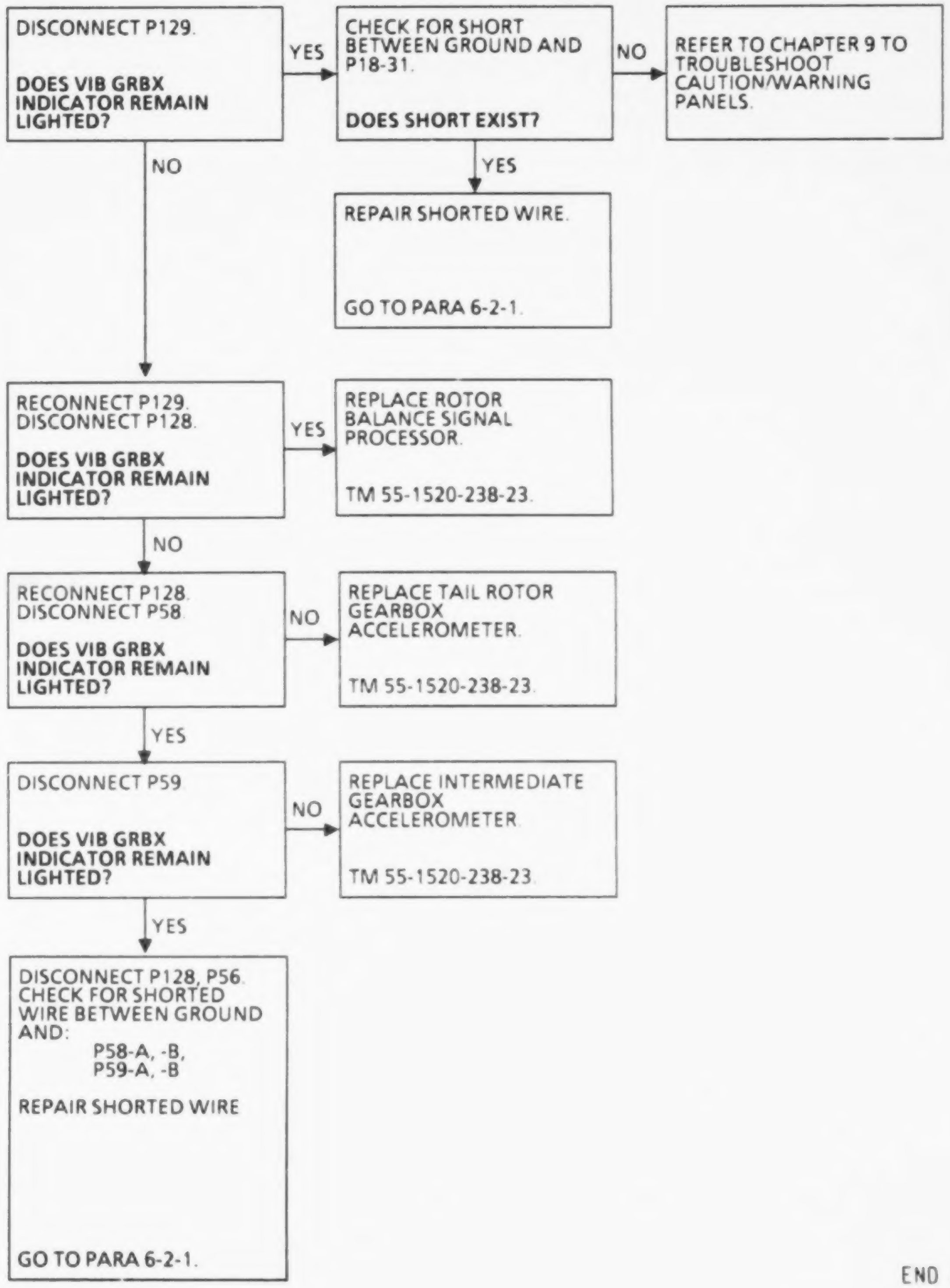

VIB GRBX
INDICATOR
ENG 1
XMSN 2
ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL


VIB GRBX
INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

CPG CAUTION/WARNING PANEL

MM04/1-962


DISCONNECT P129.
DOES VIB GRBX INDICATOR REMAIN LIGHTED?
YES
CHECK FOR SHORT BETWEEN GROUND AND P18-31.
DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-2-1.
NO
RECONNECT P129. DISCONNECT P128.
DOES VIB GRBX INDICATOR REMAIN LIGHTED?
YES
REPLACE ROTOR BALANCE SIGNAL PROCESSOR.
TM 55-1520-238-23.
NO
RECONNECT P128. DISCONNECT P58.
DOES VIB GRBX INDICATOR REMAIN LIGHTED?
NO
REPLACE TAIL ROTOR GEARBOX ACCELEROMETER.
TM 55-1520-238-23.
YES
DISCONNECT P59
DOES VIB GRBX INDICATOR REMAIN LIGHTED?
NO
REPLACE INTERMEDIATE GEARBOX ACCELEROMETER.
TM 55-1520-238-23.
YES
DISCONNECT P128, P56. CHECK FOR SHORTED WIRE BETWEEN GROUND AND:
P58-A, -B,
P59-A, -B
REPAIR SHORTED WIRE
GO TO PARA 6-2-1.

END OF TASK

6-2-29. OIL PSI ACC PUMP INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Powertrain	5180-00-003-5267
Multimeter, Digital AN/PSM-45	6625-01-139-2512
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720

Personnel Required:

68F10 Aircraft Electrician
68D10 Powertrain Repairer
67R20 Attack Helicopter Repairer

References:

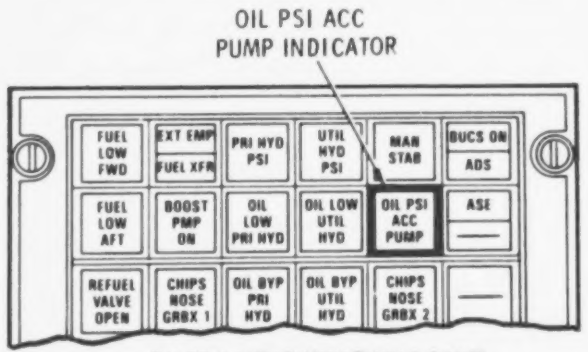
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200, T250L, T250R, T290L, T290R, and L325 access door open
	APU operating
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

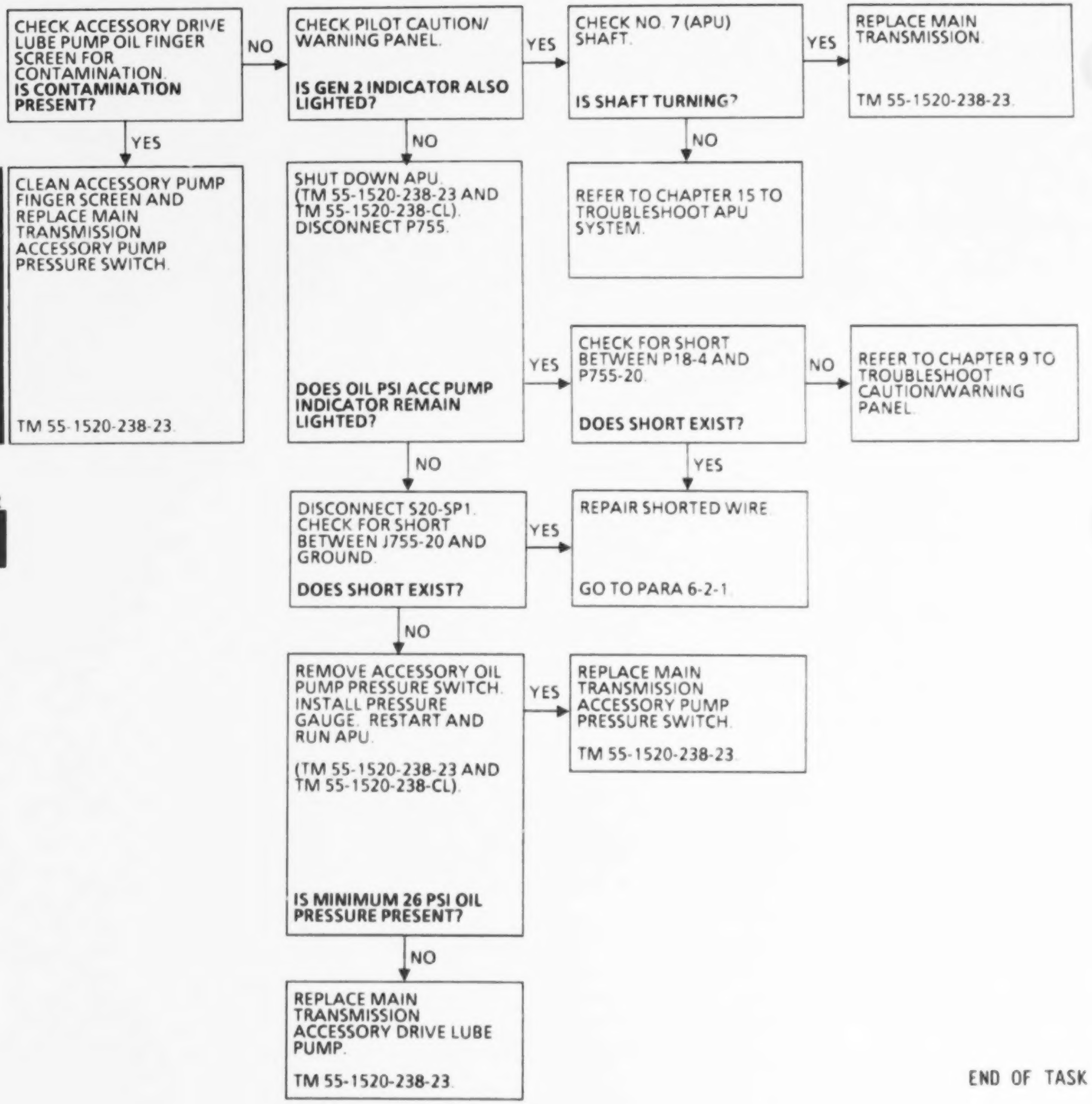
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OIL PSI ACC
PUMP INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2

PILOT CAUTION/WARNING PANEL

MM04/1-963



CHECK ACCESSORY DRIVE LUBE PUMP OIL FINGER SCREEN FOR CONTAMINATION.
IS CONTAMINATION PRESENT?

YES: CLEAN ACCESSORY PUMP FINGER SCREEN AND REPLACE MAIN TRANSMISSION ACCESSORY PUMP PRESSURE SWITCH.
TM 55-1520-238-23.

NO: CHECK PILOT CAUTION/WARNING PANEL.
IS GEN 2 INDICATOR ALSO LIGHTED?

YES: CHECK NO. 7 (APU) SHAFT.
IS SHAFT TURNING?

YES: REPLACE MAIN TRANSMISSION.
TM 55-1520-238-23.

NO: REFER TO CHAPTER 15 TO TROUBLESHOOT APU SYSTEM.

NO: SHUT DOWN APU (TM 55-1520-238-23 AND TM 55-1520-238-CL). DISCONNECT P755.
DOES OIL PSI ACC PUMP INDICATOR REMAIN LIGHTED?

YES: CHECK FOR SHORT BETWEEN P18-4 AND P755-20.
DOES SHORT EXIST?

NO: REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANEL.

YES: REPAIR SHORTED WIRE.
GO TO PARA 6-2-1.

NO: DISCONNECT S20-SP1. CHECK FOR SHORT BETWEEN J755-20 AND GROUND.
DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE.
GO TO PARA 6-2-1.

NO: REMOVE ACCESSORY OIL PUMP PRESSURE SWITCH. INSTALL PRESSURE GAUGE. RESTART AND RUN APU.
(TM 55-1520-238-23 AND TM 55-1520-238-CL).
IS MINIMUM 26 PSI OIL PRESSURE PRESENT?

YES: REPLACE MAIN TRANSMISSION ACCESSORY PUMP PRESSURE SWITCH.
TM 55-1520-238-23.

NO: REPLACE MAIN TRANSMISSION ACCESSORY DRIVE LUBE PUMP.
TM 55-1520-238-23.

END OF TASK

6-2-30. VIB MON CIRCUIT BREAKER (CB79) - DOES NOT STAY CLOSED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

References:

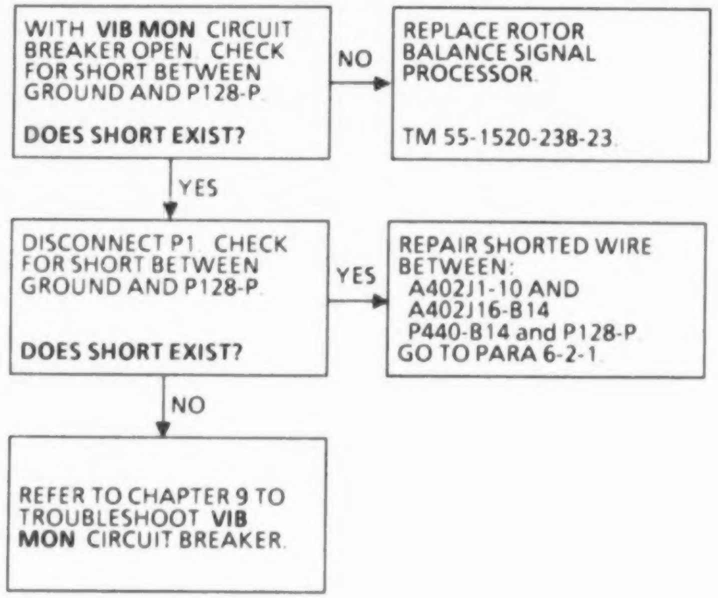
TM 55-1520-238-23

Personnel Required:

68F10	Aircraft Electrician
	One person to assist

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



WITH **VIB MON** CIRCUIT BREAKER OPEN. CHECK FOR SHORT BETWEEN GROUND AND P128-P.

DOES SHORT EXIST?

NO: REPLACE ROTOR BALANCE SIGNAL PROCESSOR.

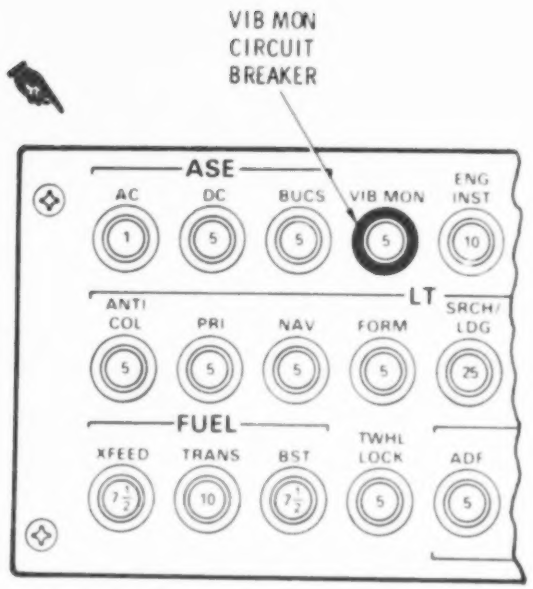
TM 55-1520-238-23.

YES: DISCONNECT P1. CHECK FOR SHORT BETWEEN GROUND AND P128-P.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
A402J1-10 AND A402J16-B14
P440-B14 and P128-P
GO TO PARA 6-2-1.

NO: REFER TO CHAPTER 9 TO TROUBLESHOOT **VIB MON** CIRCUIT BREAKER.


VIB MON CIRCUIT BREAKER
ASE
AC
1
DC
5
BUCS
5
VIB MON
5
ENG INST
10
LT
ANTI COL
5
PRI
5
NAV
5
FORM
5
SRCH/LDG
25
FUEL
XFEED
7½
TRANS
10
BST
7½
TWHL LOCK
5
ADF
5

MM04/1-1415

END OF TASK

6-2-31. ENG START CIRCUIT BREAKER (CB58) - DOES NOT STAY CLOSED

Tools:

Nomenclature	Part Number
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

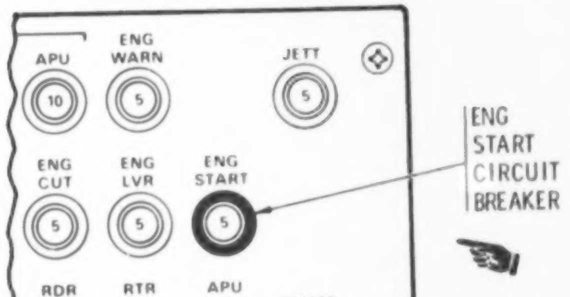
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

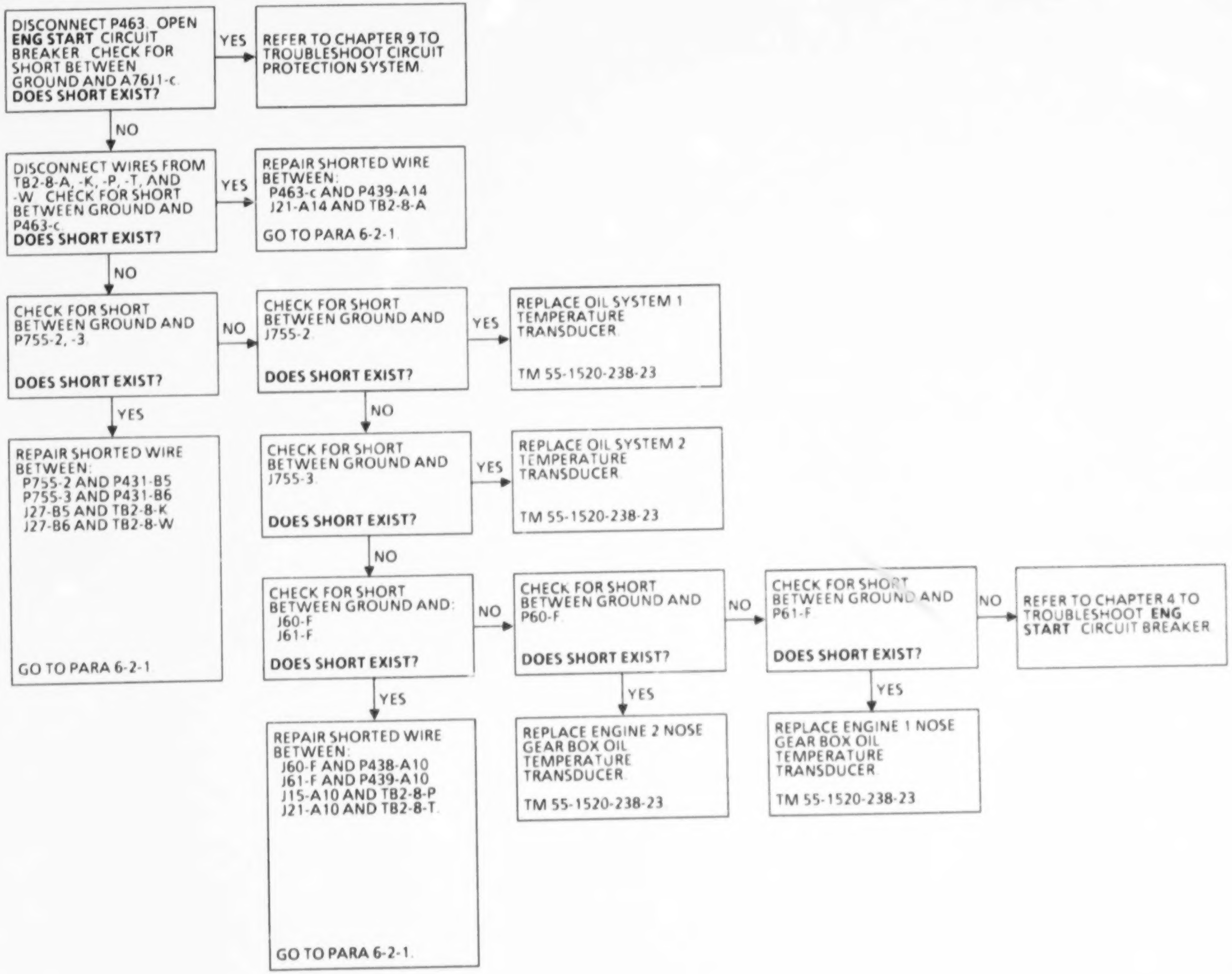
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-1422



DISCONNECT P463. OPEN **ENG START** CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND A76J1-c. **DOES SHORT EXIST?**

YES: REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

NO: DISCONNECT WIRES FROM TB2-8-A, -K, -P, -T, AND -W. CHECK FOR SHORT BETWEEN GROUND AND P463-c. **DOES SHORT EXIST?**

YES: REPAIR SHORTED WIRE BETWEEN:
P463-c AND P439-A14
J21-A14 AND TB2-8-A

GO TO PARA 6-2-1.

NO: CHECK FOR SHORT BETWEEN GROUND AND P755-2, -3. **DOES SHORT EXIST?**

YES: REPAIR SHORTED WIRE BETWEEN:
P755-2 AND P431-B5
P755-3 AND P431-B6
J27-B5 AND TB2-8-K
J27-B6 AND TB2-8-W

GO TO PARA 6-2-1.

NO: CHECK FOR SHORT BETWEEN GROUND AND J755-2. **DOES SHORT EXIST?**

YES: REPLACE OIL SYSTEM 1 TEMPERATURE TRANSDUCER.

TM 55-1520-238-23

NO: CHECK FOR SHORT BETWEEN GROUND AND J755-3. **DOES SHORT EXIST?**

YES: REPLACE OIL SYSTEM 2 TEMPERATURE TRANSDUCER.

TM 55-1520-238-23

NO: CHECK FOR SHORT BETWEEN GROUND AND:
J60-F
J61-F
DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
J60-F AND P438-A10
J61-F AND P439-A10
J15-A10 AND TB2-8-P
J21-A10 AND TB2-8-T.

GO TO PARA 6-2-1.

NO: CHECK FOR SHORT BETWEEN GROUND AND P60-F. **DOES SHORT EXIST?**

YES: REPLACE ENGINE 2 NOSE GEAR BOX OIL TEMPERATURE TRANSDUCER.

TM 55-1520-238-23

NO: CHECK FOR SHORT BETWEEN GROUND AND P61-F. **DOES SHORT EXIST?**

YES: REPLACE ENGINE 1 NOSE GEAR BOX OIL TEMPERATURE TRANSDUCER.

TM 55-1520-238-23

NO: REFER TO CHAPTER 4 TO TROUBLESHOOT **ENG START** CIRCUIT BREAKER.

6-3-1. DRIVE SYSTEM - VIBRATION OPERATION CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Powertrain Repairer's	5180-00-003-5267

Personnel Required:

68D10 Aircraft Powertrain Repairer
100KG Pilot

References:

TM 11-1520-238-23
TM 55-1520-238-10
TM 55-1520-238-CL

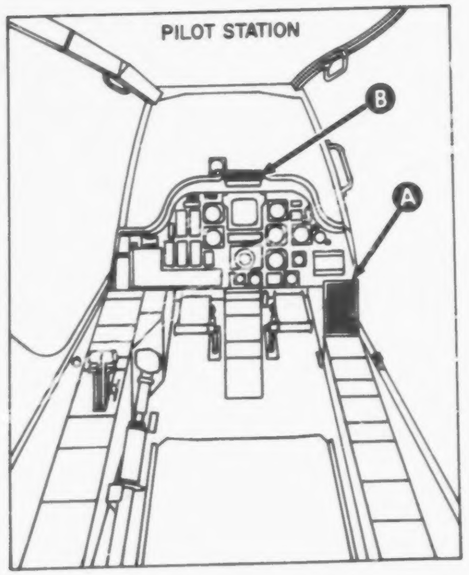
Equipment Conditions:

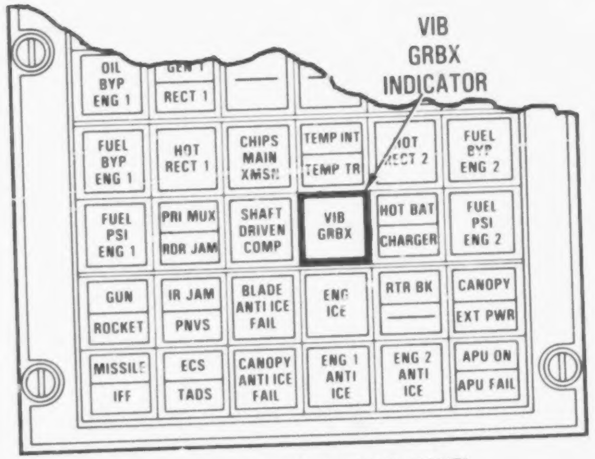
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected

WARNING

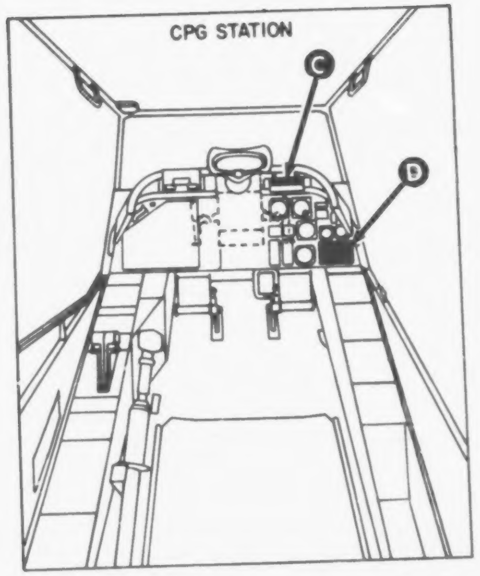
Make sure that helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting and maintenance procedures. Failure to do so could result in death or serious injury.

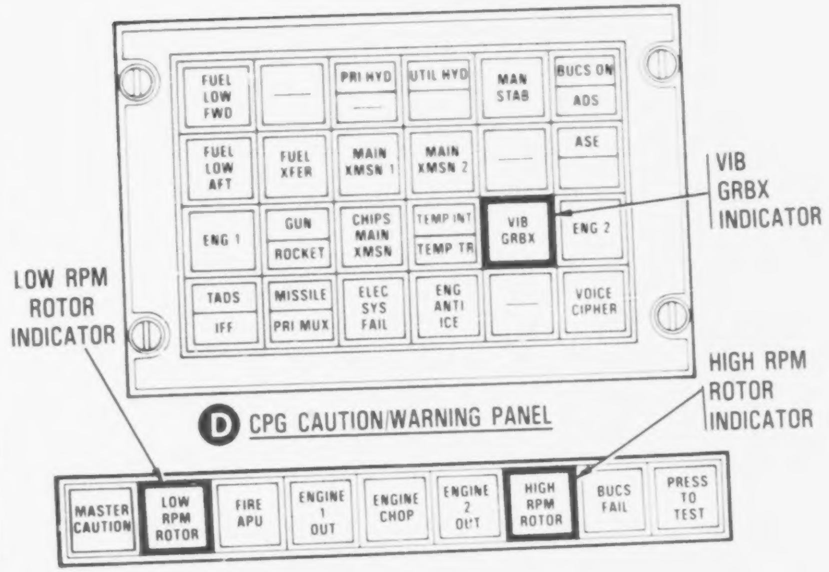
A. Perform drive system - indicators operational check (para 6-2-1).


PILOT STATION
B
A


VIB
GRBX
INDICATOR
OIL BYP ENG 1
GEN 1
RECT 1
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

Ⓐ PILOT CAUTION/WARNING PANEL


CPG STATION
C
D


FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER
VIB
GRBX
INDICATOR
LOW RPM
ROTOR
INDICATOR
HIGH RPM
ROTOR
INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

Ⓓ CPG CAUTION/WARNING PANEL

Ⓑ Ⓒ MASTER CAUTION/WARNING PANEL
(TYPICAL)

MM04/1-947

GO TO NEXT PAGE

6-3-1. DRIVE SYSTEM - VIBRATION OPERATIONAL CHECK (cont)

B. Complete operational check as follows:

TASK	RESULT
1. Start and run up helicopter. Check that **LOW RPM ROTOR** indicator goes out when N_r RPM reaches or is above 93 percent (TM 55-1520-238-10).	If main rotor or tail rotor do not rotate, refer to TM 55-1520-238-23 to inspect drive system. If **LOW RPM ROTOR** indicator remains lighted above 93 percent N_r on pilot and CPG master caution/warning panels, go to para 6-3-2.
2. Increase power on one engine to 100 percent, and then retard throttle slowly until N_p gage reads 80 to 85 percent.	
3. On pilot and CPG master caution/warning panels, check **LOW RPM ROTOR** indicators. Listen for low rotor audible warning in pilot and CPG headsets.	If pilot **LOW RPM ROTOR** indicator does not light at 93 percent or less, go to para 6-3-3. If CPG **LOW RPM ROTOR** indicator does not light at 93 percent or less, go to para 6-3-4. If low rotor audio warning is not heard in both headsets, refer to chapter 9 to troubleshoot low rotor audio warning.

CAUTION

During autorotation do not allow rotor speed to exceed 110 percent. Failure to control main rotor blade speed can result in root area cracks, rotor delamination or rotor distortion.

TASK	RESULT
4. In flight perform autorotation. Allow rotor speed to increase past 100 percent N_r to light **HI RPM ROTOR** indicator, but do not exceed 110 percent N_r.	If pilot **HI RPM ROTOR** indicator does not light at 104 percent N_r, go to para 6-2-5. If CPG **HI RPM ROTOR** indicator does not light at 104 percent N_r, go to para 6-3-6.

TASK	RESULT
5. In flight at 100 knots, check **VIB GRBX** indicator on pilot and CPG caution/warning panels.	If both **VIB GRBX** indicators light, go to para 6-3-7. If **VIB GRBX** indicator lights on CPG caution/warning panel but not on pilot caution/warning panel, refer to chapter 9 to troubleshoot CPG caution/warning panel.

C. Land and shut down helicopter (TM 55-1520-238-10).

END OF TASK

6-3-2. LOW RPM ROTOR INDICATORS - REMAIN LIGHTED ABOVE 93 PERCENT NR

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

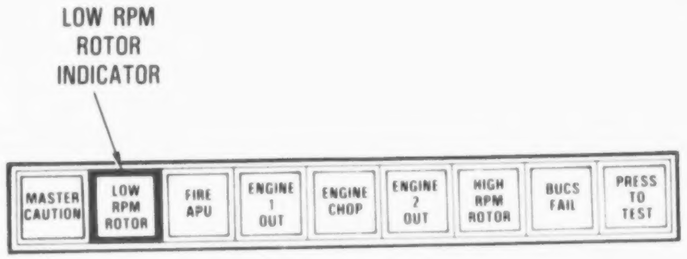
100KG	Pilot
68F10	Aircraft Electrician One person to assist

References:

TM 55-1520-238-23
TM 55-1520-238-CL

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 6-1-4	DRIVE SYSTEM - POWER UP completed
TM 55-1520-238-CL	Helicopter Operating above 93% NR

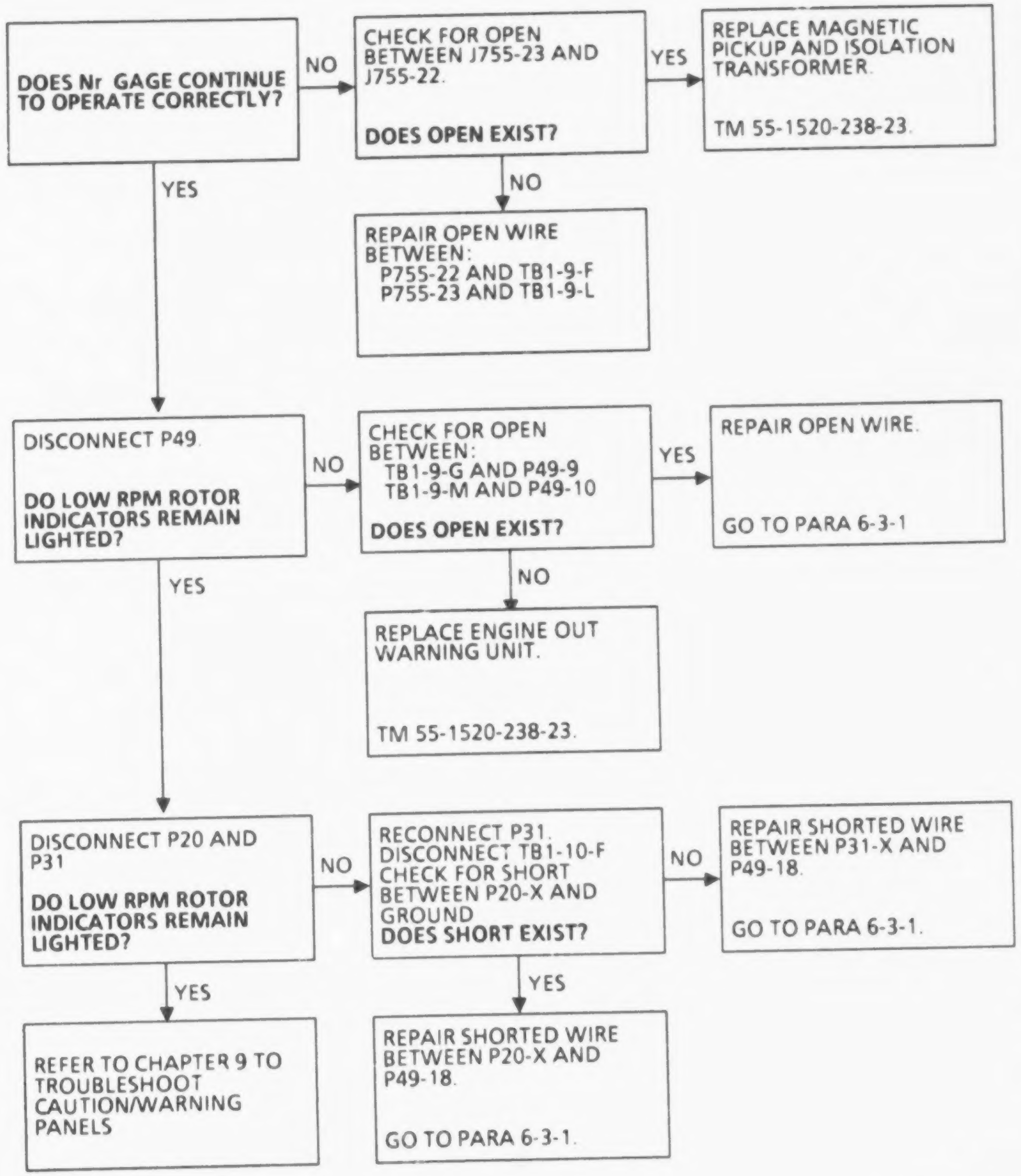

LOW RPM ROTOR INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL
(TYPICAL)

MM04/1-948

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


DOES Nr GAGE CONTINUE TO OPERATE CORRECTLY?
NO
CHECK FOR OPEN BETWEEN J755-23 AND J755-22. DOES OPEN EXIST?
YES
REPLACE MAGNETIC PICKUP AND ISOLATION TRANSFORMER. TM 55-1520-238-23.
NO
REPAIR OPEN WIRE BETWEEN: P755-22 AND TB1-9-F P755-23 AND TB1-9-L
YES
DISCONNECT P49. DO LOW RPM ROTOR INDICATORS REMAIN LIGHTED?
NO
CHECK FOR OPEN BETWEEN: TB1-9-G AND P49-9 TB1-9-M AND P49-10 DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 6-3-1
NO
REPLACE ENGINE OUT WARNING UNIT. TM 55-1520-238-23.
YES
DISCONNECT P20 AND P31 DO LOW RPM ROTOR INDICATORS REMAIN LIGHTED?
NO
RECONNECT P31. DISCONNECT TB1-10-F CHECK FOR SHORT BETWEEN P20-X AND GROUND DOES SHORT EXIST?
NO
REPAIR SHORTED WIRE BETWEEN P31-X AND P49-18. GO TO PARA 6-3-1.
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS
YES
REPAIR SHORTED WIRE BETWEEN P20-X AND P49-18. GO TO PARA 6-3-1.

END OF TASK

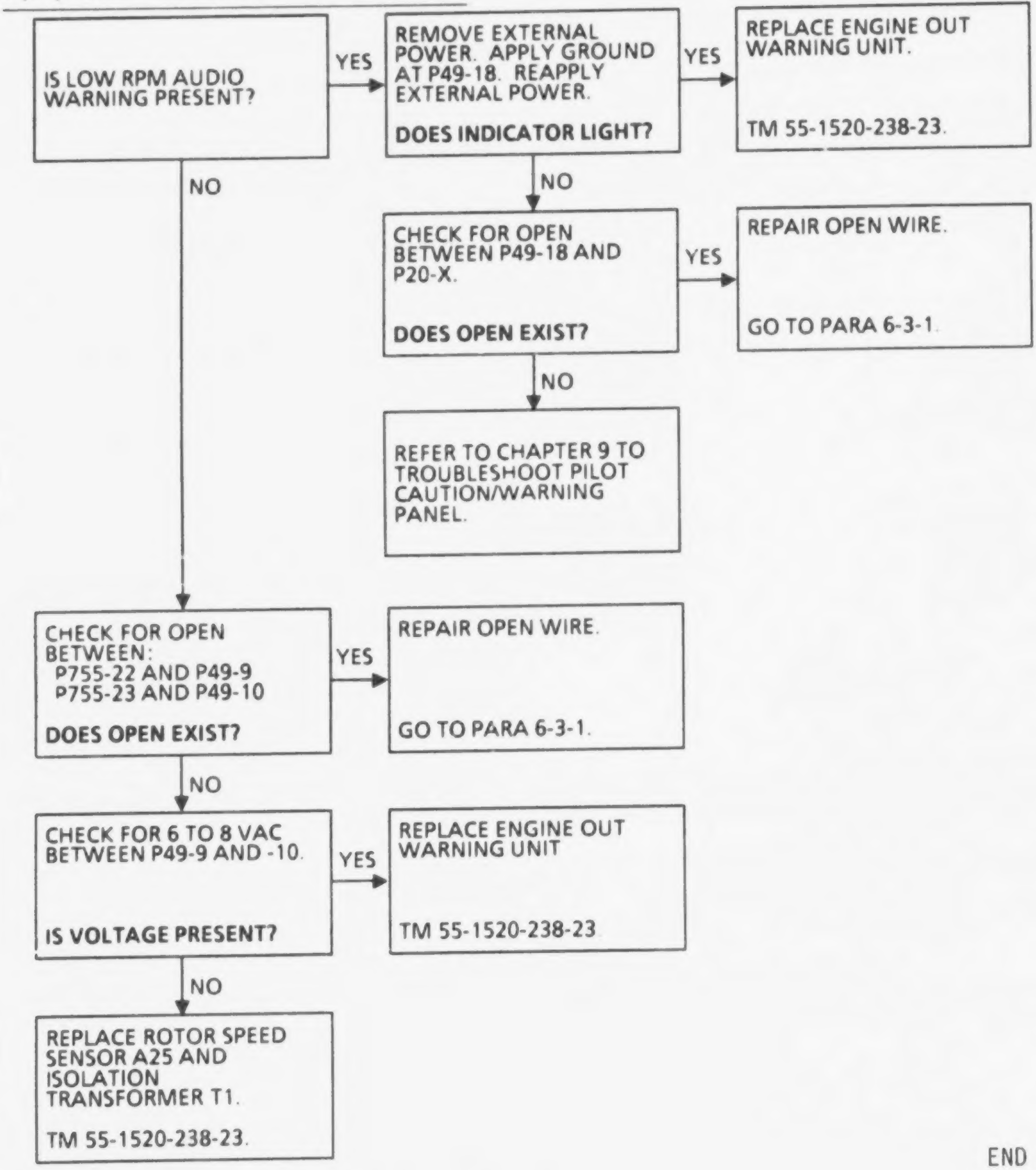
6-3-3. PILOT LOW RPM ROTOR INDICATOR - DOES NOT LIGHT

Tools: (para 6-3-2)

Personnel Required: (para 6-3-2)

References: (para 6-3-2)

Equipment Conditions: (para 6-3-2)


IS LOW RPM AUDIO WARNING PRESENT?
YES
REMOVE EXTERNAL POWER. APPLY GROUND AT P49-18. REAPPLY EXTERNAL POWER. DOES INDICATOR LIGHT?
YES
REPLACE ENGINE OUT WARNING UNIT. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN P49-18 AND P20-X. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 6-3-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CAUTION/WARNING PANEL.
NO
CHECK FOR OPEN BETWEEN: P755-22 AND P49-9 P755-23 AND P49-10 DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 6-3-1.
NO
CHECK FOR 6 TO 8 VAC BETWEEN P49-9 AND -10. IS VOLTAGE PRESENT?
YES
REPLACE ENGINE OUT WARNING UNIT TM 55-1520-238-23
NO
REPLACE ROTOR SPEED SENSOR A25 AND ISOLATION TRANSFORMER T1. TM 55-1520-238-23.

END OF TASK

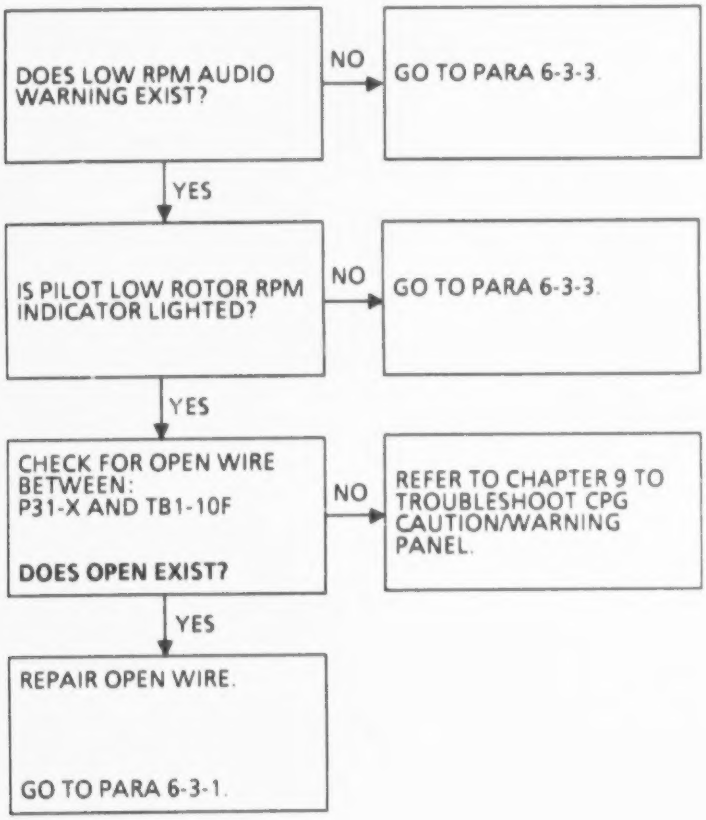
6-3-4. CPG LOW RPM ROTOR INDICATOR - DOES NOT LIGHT

Tools: (para 6-3-2)

Personnel Required: (para 6-3-2)

References: (para 6-3-2)

Equipment Conditions: (para 6-3-2)


DOES LOW RPM AUDIO WARNING EXIST?
NO
GO TO PARA 6-3-3.
YES
IS PILOT LOW ROTOR RPM INDICATOR LIGHTED?
NO
GO TO PARA 6-3-3.
YES
CHECK FOR OPEN WIRE BETWEEN:
P31-X AND TB1-10F
DOES OPEN EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CPG CAUTION/WARNING PANEL.
YES
REPAIR OPEN WIRE.
GO TO PARA 6-3-1.

END OF TASK

6-3-5. PILOT HIGH RPM ROTOR INDICATOR - DOES NOT LIGHT AT 104 PERCENT N_R

Tools:

Nomenclature	Part Number (NSN)
Tool Kit Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

References:

TM 55-1520-238-23

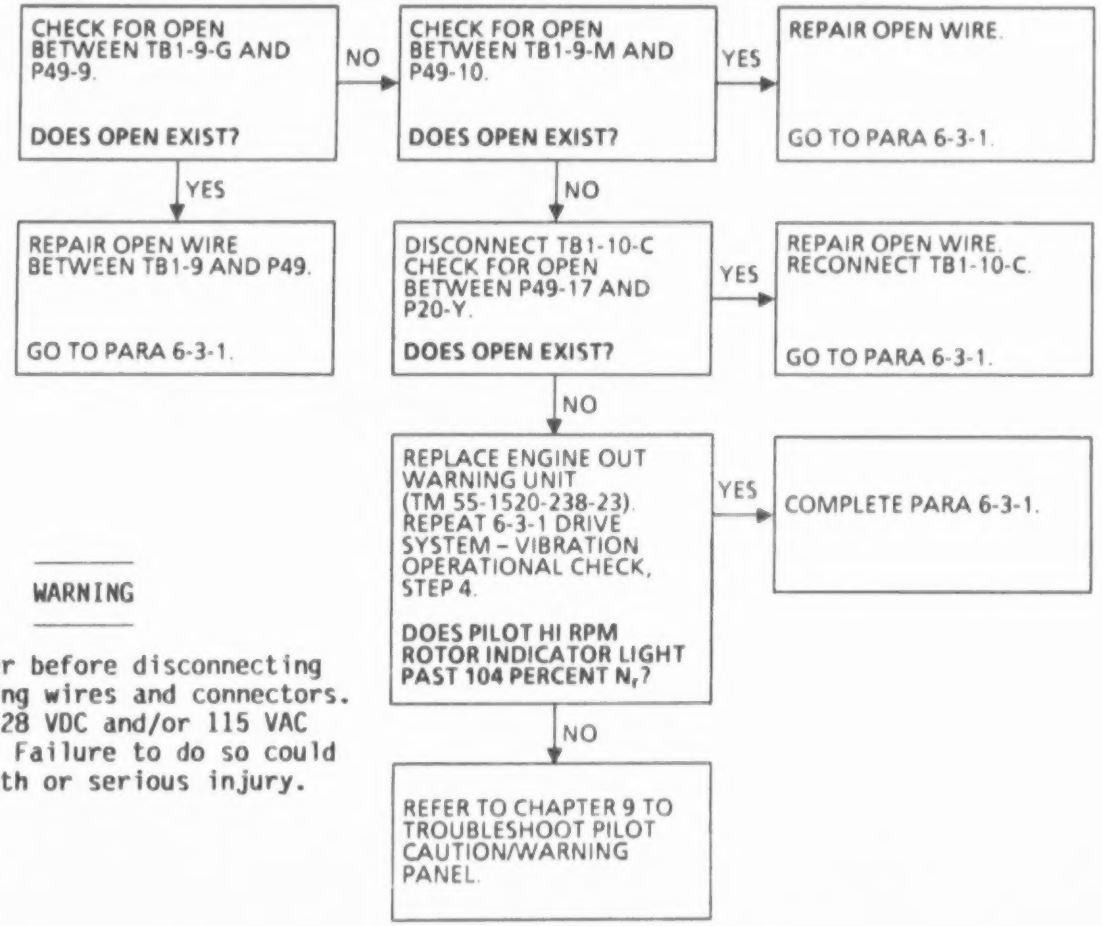
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L140 fairing open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

Personnel Required:

68F10 Aircraft Electrician
One person to assist

REFER TO VOLTAGE WARNING



CHECK FOR OPEN BETWEEN TB1-9-G AND P49-9.
DOES OPEN EXIST?
NO
YES
CHECK FOR OPEN BETWEEN TB1-9-M AND P49-10.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 6-3-1.
REPAIR OPEN WIRE BETWEEN TB1-9 AND P49.
GO TO PARA 6-3-1.
NO
DISCONNECT TB1-10-C CHECK FOR OPEN BETWEEN P49-17 AND P20-Y.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. RECONNECT TB1-10-C.
GO TO PARA 6-3-1.
NO
REPLACE ENGINE OUT WARNING UNIT (TM 55-1520-238-23). REPEAT 6-3-1 DRIVE SYSTEM – VIBRATION OPERATIONAL CHECK, STEP 4.
DOES PILOT HI RPM ROTOR INDICATOR LIGHT PAST 104 PERCENT N$_r$?
YES
COMPLETE PARA 6-3-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT CAUTION/WARNING PANEL.

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

END OF TASK

6-3-6. CPG HIGH RPM ROTOR INDICATOR - DOES NOT LIGHT AT 104 PERCENT N_R

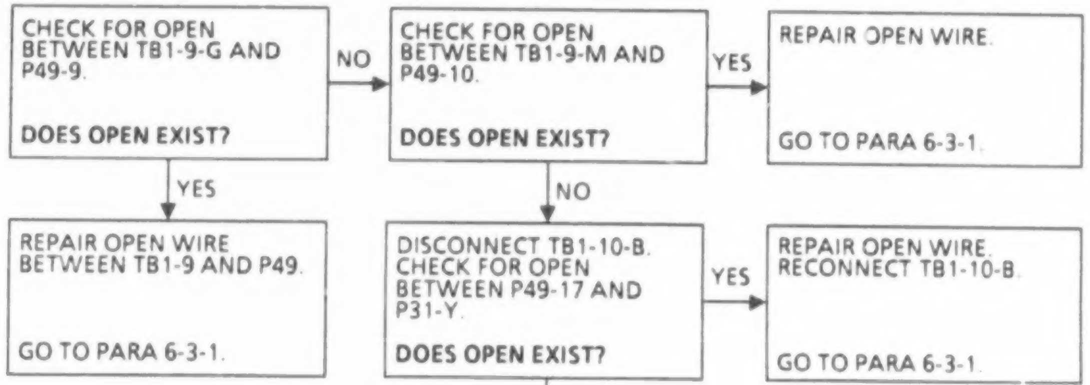
Tools: (para 6-3-5)

Personnel Required: (para 6-3-5)

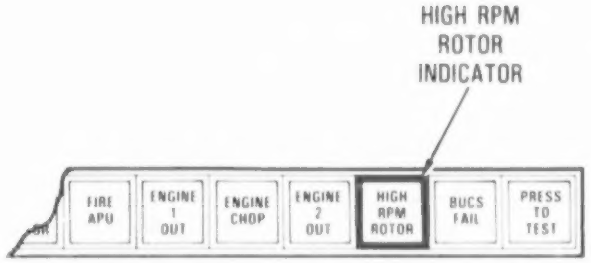
References: (para 6-3-5)

Equipment Conditions: (para 6-3-5)

REFER TO VOLTAGE WARNING

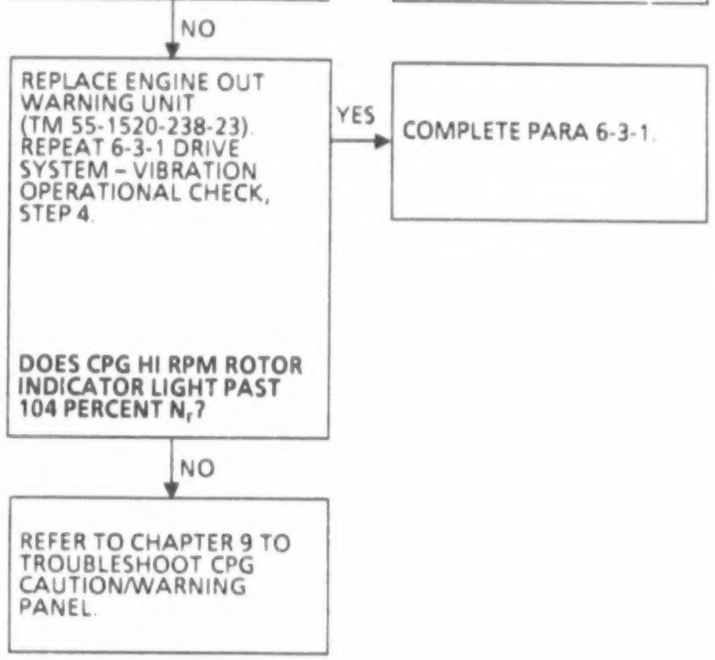


CHECK FOR OPEN BETWEEN TB1-9-G AND P49-9.
DOES OPEN EXIST?
NO
CHECK FOR OPEN BETWEEN TB1-9-M AND P49-10.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 6-3-1.
YES
REPAIR OPEN WIRE BETWEEN TB1-9 AND P49.
GO TO PARA 6-3-1.
NO
DISCONNECT TB1-10-B. CHECK FOR OPEN BETWEEN P49-17 AND P31-Y.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. RECONNECT TB1-10-B.
GO TO PARA 6-3-1.



HIGH RPM ROTOR INDICATOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

MASTER CAUTION/WARNING PANEL
(TYPICAL)
MM04/1-949



NO
REPLACE ENGINE OUT WARNING UNIT (TM 55-1520-238-23). REPEAT 6-3-1 DRIVE SYSTEM – VIBRATION OPERATIONAL CHECK, STEP 4.
DOES CPG HI RPM ROTOR INDICATOR LIGHT PAST 104 PERCENT N$_r$?
YES
COMPLETE PARA 6-3-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CPG CAUTION/WARNING PANEL.

END OF TASK

6-3-7. VIB GRBX INDICATOR - LIGHTS

Tools: (para 6-3-5)

Personnel Required:

100KG Pilot
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

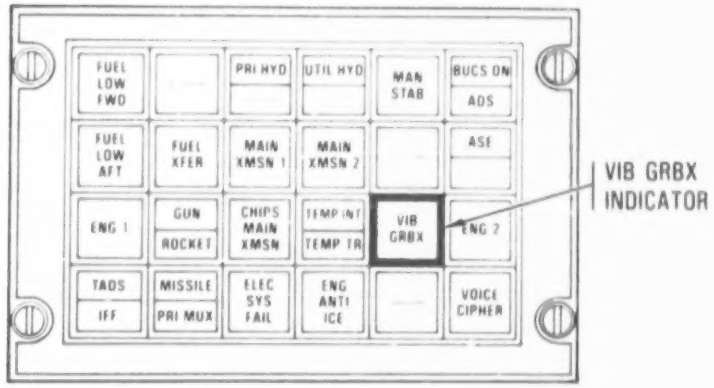
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

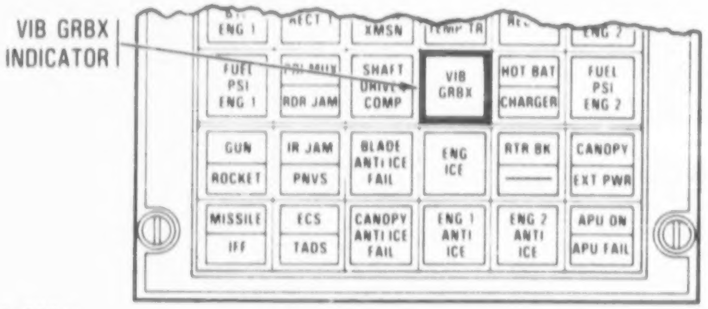
Ref	Condition
TM 55-1520-238-CL	Helicopter in hover

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

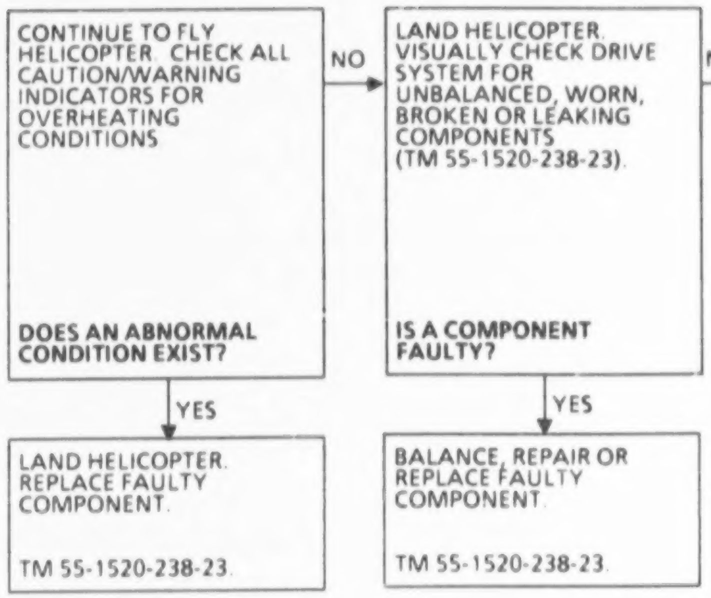
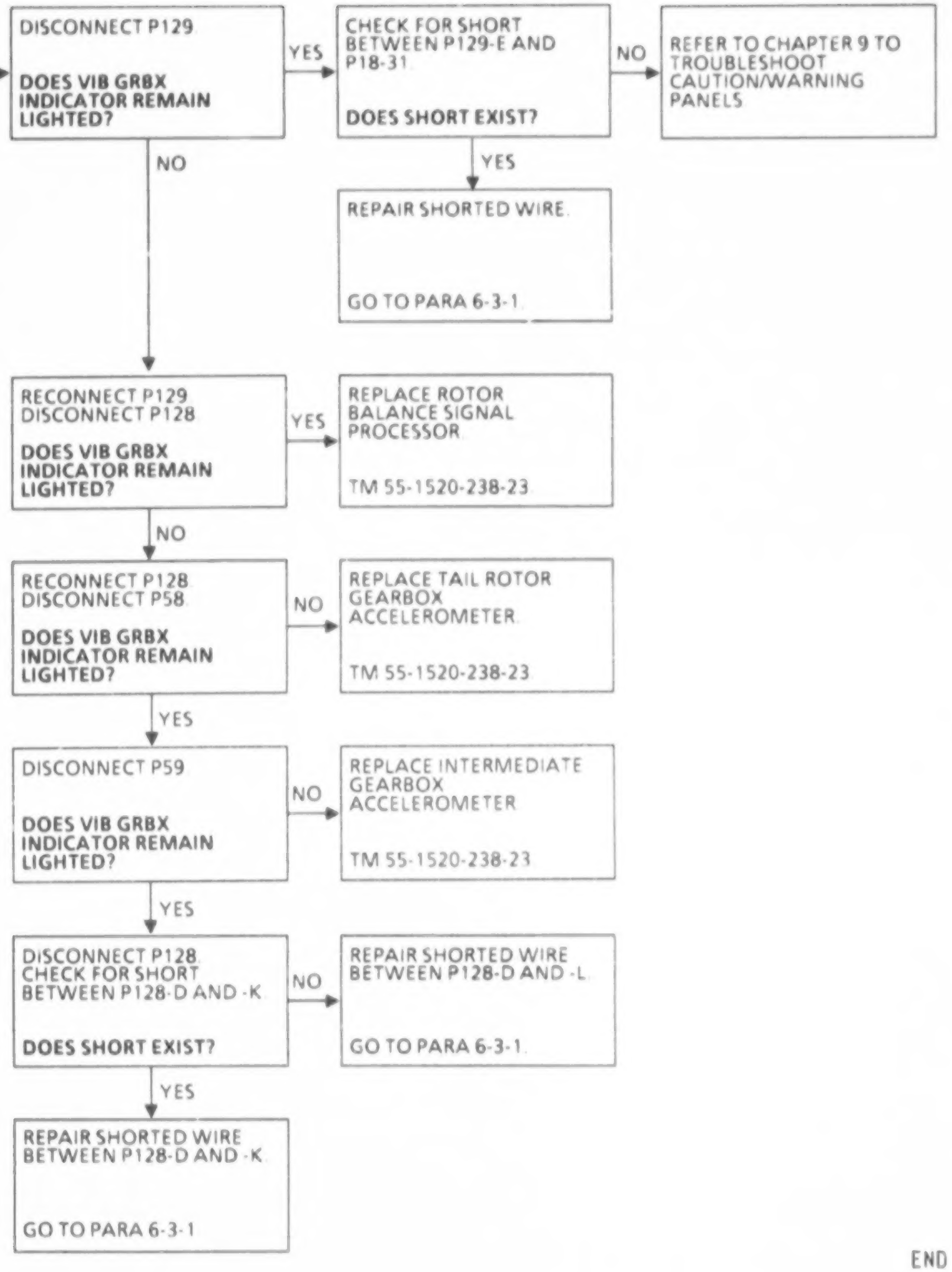

FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER
VIB GRBX INDICATOR

CPG CAUTION/WARNING PANEL


VIB GRBX INDICATOR
ENG 1
RECT 1
XMSN
TEMP TR
ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVE COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
FCS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL

MM04/1-950



CONTINUE TO FLY HELICOPTER. CHECK ALL CAUTION/WARNING INDICATORS FOR OVERHEATING CONDITIONS

DOES AN ABNORMAL CONDITION EXIST?

YES

LAND HELICOPTER. REPLACE FAULTY COMPONENT.

TM 55-1520-238-23.

NO

LAND HELICOPTER. VISUALLY CHECK DRIVE SYSTEM FOR UNBALANCED, WORN, BROKEN OR LEAKING COMPONENTS (TM 55-1520-238-23).

IS A COMPONENT FAULTY?

YES

BALANCE, REPAIR OR REPLACE FAULTY COMPONENT.

TM 55-1520-238-23.

NO

DISCONNECT P129

DOES VIB GRBX INDICATOR REMAIN LIGHTED?

YES

CHECK FOR SHORT BETWEEN P129-E AND P18-31.

DOES SHORT EXIST?

NO

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

YES

REPAIR SHORTED WIRE.

GO TO PARA 6-3-1.

NO

RECONNECT P129
DISCONNECT P128

DOES VIB GRBX INDICATOR REMAIN LIGHTED?

YES

REPLACE ROTOR BALANCE SIGNAL PROCESSOR.

TM 55-1520-238-23

NO

RECONNECT P128
DISCONNECT P58.

DOES VIB GRBX INDICATOR REMAIN LIGHTED?

NO

REPLACE TAIL ROTOR GEARBOX ACCELEROMETER.

TM 55-1520-238-23

YES

DISCONNECT P59

DOES VIB GRBX INDICATOR REMAIN LIGHTED?

NO

REPLACE INTERMEDIATE GEARBOX ACCELEROMETER.

TM 55-1520-238-23

YES

DISCONNECT P128.
CHECK FOR SHORT BETWEEN P128-D AND -K.

DOES SHORT EXIST?

NO

REPAIR SHORTED WIRE BETWEEN P128-D AND -L.

GO TO PARA 6-3-1.

YES

REPAIR SHORTED WIRE BETWEEN P128-D AND -K.

GO TO PARA 6-3-1

END OF TASK

6-4-1. DRIVE SYSTEM - DYNAMIC OPERATIONAL CHECK

Personnel Required:

68D10 Aircraft Powertrain Repairer
100KG Pilot

References:

TM 55-1520-238-10
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 6-2-1	DRIVE SYSTEM - INDICATORS OPERATIONAL CHECK completed

WARNING

Make sure that helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance procedures. Failure to do so could result in death or serious injury.

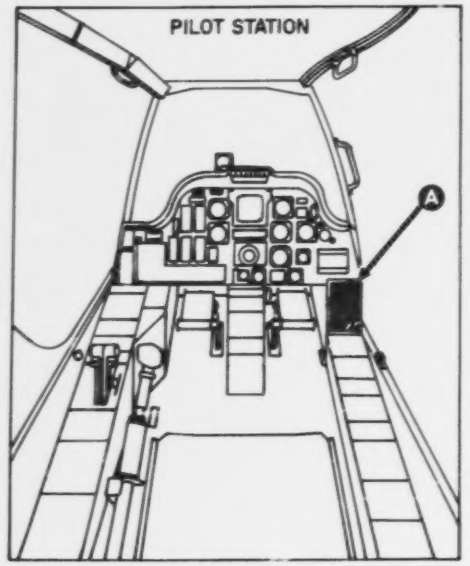
A. Start and run up helicopter. Ground run at 100% N_R until all components temperatures stabilize (TM 55-1520-238-10). While ground running, check the instruments and caution/warning panels for abnormal drive system conditions.

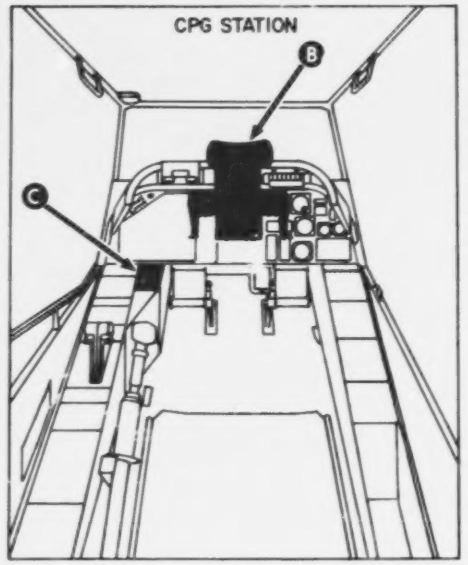
B. Perform FD/LS OPERATION - STARTING (Chapter 1).

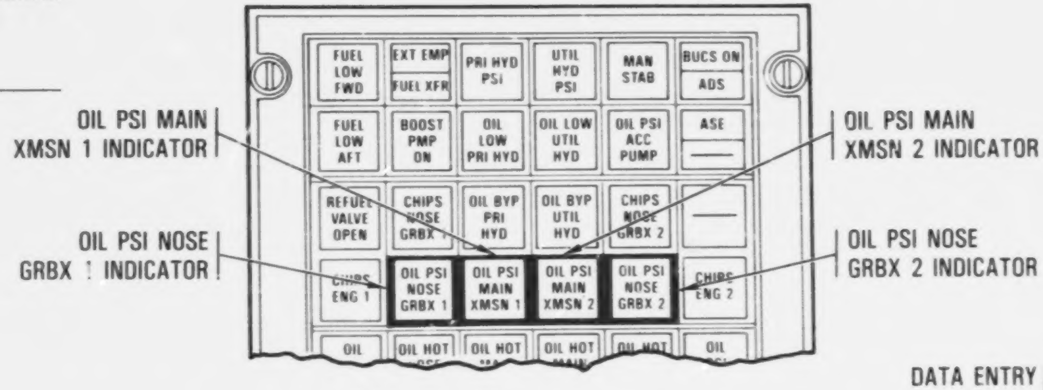
C. On DEK, set **DATA ENTRY** switch to **FD/LS**.

D. Depress any DEK key except **ENTER SPACE** or **SHIFT** keys.

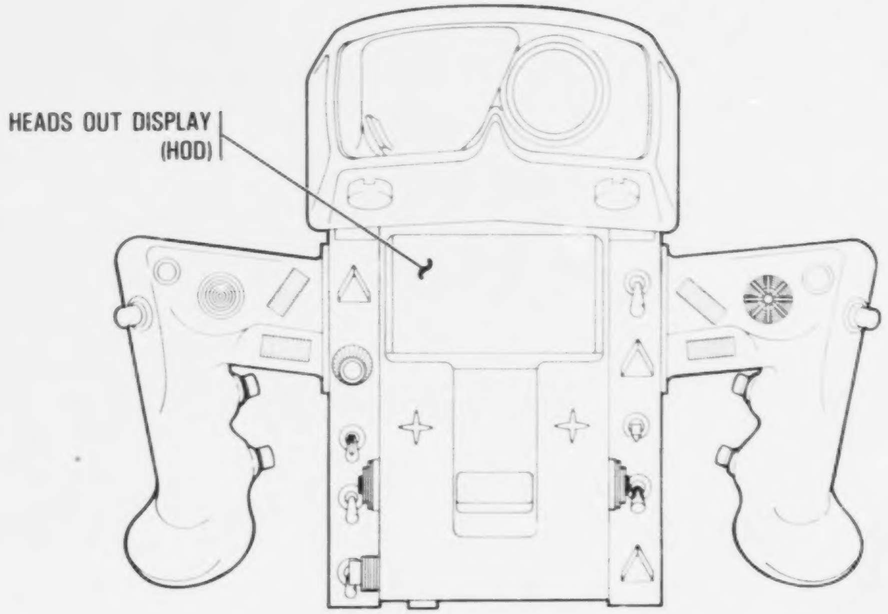
E. Depress DEK keys **1** and **9**, and note FD/LS display readings on CPG ORT HOD.


PILOT STATION
A

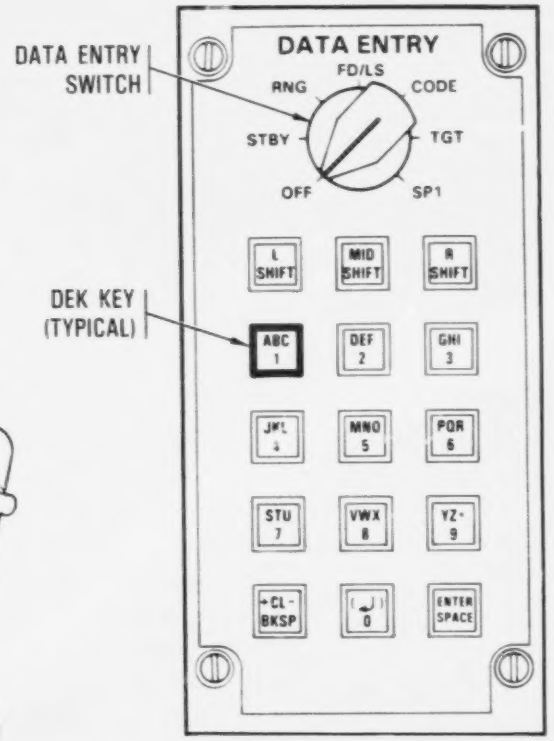

CPG STATION
B
C


OIL PSI MAIN XMSN 1 INDICATOR
OIL PSI NOSE GRBX 1 INDICATOR
OIL PSI MAIN XMSN 2 INDICATOR
OIL PSI NOSE GRBX 2 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2

A PILOT CAUTION/WARNING PANEL


HEADS OUT DISPLAY (HOD)

B OPTICAL RELAY TUBE (ORT)


DATA ENTRY SWITCH
DEK KEY (TYPICAL)
DATA ENTRY
FD/LS
RNG
CODE
STBY
TGT
OFF
SP1
L SHIFT
MID SHIFT
R SHIFT
ABC 1
DEF 2
GHI 3
JKL 4
MNO 5
PQR 6
STU 7
VWX 8
YZ 9
CL BKSP
0
ENTER SPACE

C DATA ENTRY KEYBOARD (DEK)

MM04/1-967-1A

GO TO NEXT PAGE

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6-4-1. DRIVE SYSTEM - DYNAMIC OPERATIONAL CHECK (cont)

CAUTION

Shut down the helicopter if the HOD displays a **28LB** or less oil pressure reading on any component, or an oil temperature reading climb above **140C** on any component. Failure to shut down helicopter can result in damage to the drive system.

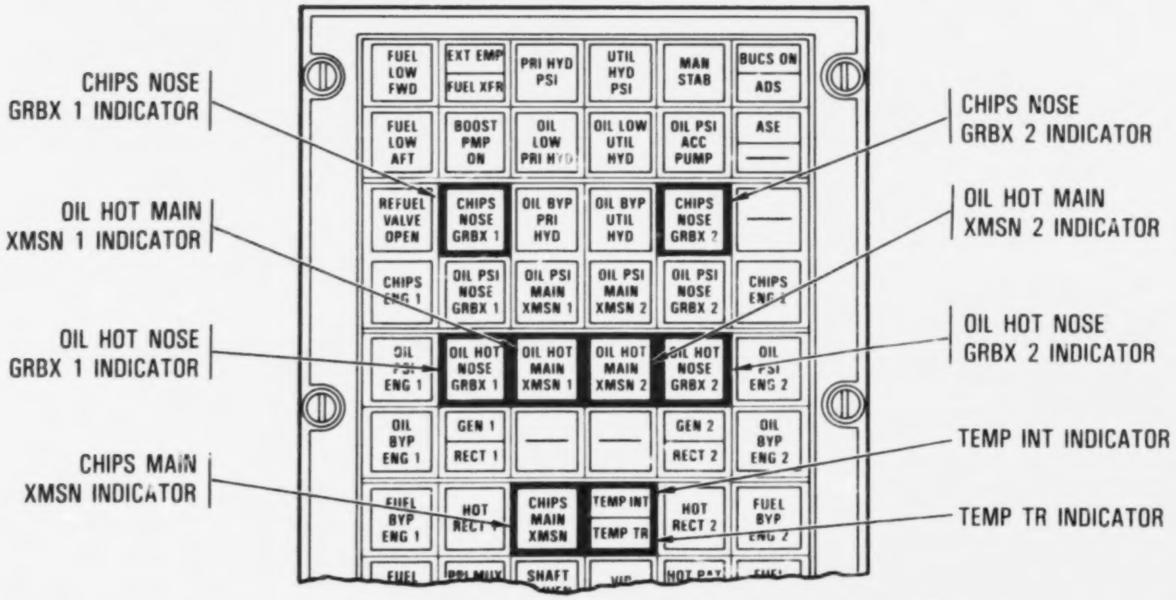
F. Complete operational check as follows:

TASK	RESULT
1. On CPG ORT HOD, check FD/LS display for **NGB1** oil pressure reading.	If HOD displays a **28LB** or less reading for **NGB1** oil pressure, shut down helicopter and go to para 6-4-2.
	If HOD displays a reading from **29LB** through **54LB** for **NGB1** oil pressure, to go para 6-4-3.
2. On pilot caution/warning panel, check **OIL PSI NOSE GRBX 1** indicator.	If **OIL PSI NOSE GRBX 1** indicator lights, and HOD displays a **55LB** to **65LB** reading for **NGB1**, shut down helicoper and go to para 6-4-4.
	If **OIL PSI NOSE GRBX 1** indicator lights, and HOD displays a **29LB** to **54LB** reading for **NGB1** oil pressure, go to para 6-4-5.
3. On CPG ORT HOD, check FD/LS display for **XMN1** oil pressure reading.	If HOD displays a **28LB** or less reading for **XMN1** oil pressure, shut down helicopter and go to para 6-4-6.
	If HOD displays a reading from **29LB** through **49LB** for **XMN1** oil pressure, go to para 6-4-7.
4. On pilot caution/warning panel, check **OIL PSI MAIN XMSN 1** indicator	If **OIL PSI MAIN XMSN 1** indicator lights, and HOD displays a **50LB** to **80LB** reading for **XMN1**, shut down helicopter and go to para 6-4-8.
	If **OIL PSI MAIN XMSN 1** indicator lights, and HOD dipslays a **29LB** to **49LB** reading for **XMN1** oil pressure, go to para 6-4-9.
5. On CPG ORT HOD, check FD/LS display for **XMN2** oil pressure reading.	If HOD displays a **28LB** or less reading for **XMN2** oil pressure, shut down helicopter and go to para 6-4-10.
	If HOD displays a reading from **29LB** through **49LB** for **XMN2** oil pressure, go to para 6-4-11.
6. On pilot caution/warning panel, check **OIL PSI MAIN XMSN 2** indicator.	If **OIL PSI MAIN XMSN 2** indicator lights, and HOD displays a **50LB** to **80LB** reading for **XMN2**, shut down helicopter and go to para 6-4-12.
	If **OIL PSI MAIN XMSN 2** indicator lights, and HOD displays a **29LB** to **49 LB** reading for **XMN2** oil pressure, go to para 6-4-13.
7. On CPG ORT HOD, check FD/LS display for **NGB2** oil pressure reading.	If HOD displays a **28LB** or less reading for **NGB2** oil pressure, shut down helicopter and go to para 6-4-14.
	If HOD displays a reading from **29LB** through **54LB** for **NGB2** oil pressure, go to para 6-4-15.
8. On pilot caution/warning panel, check **OIL PSI NOSE GRBX 2** indicator.	If **OIL PSI NOSE GRBX 2** indicator lights, and HOD displays a **55LB** to **65LB** reading for **NGB2**, shut down helicopter and go to para 6-4-16.
	If **OIL PSI NOSE GRBX 2** indicator lights, and HOD displays a **29LB** to **54LB** oil pressure, go to para 6-4-17.
9. On CPG ORT HOD, check FD/LS display for **NGB1** oil temperature reading.	If HOD displays a **140C** or more reading for **NGB1** oil temperature, shut down helicopter and go to para 6-4-18.
	If HOD displays a reading between **121C** and **139C** for **NGB1** oil temperature, go to para 6-4-19.
10. On pilot caution/warning panel, check **OIL HOT NOSE GRBX 1** indicator.	If **OIL HOT NOSE GRBX 1** indicator lights, and HOD displays a **103C** to **120C** temperature reading for **NGB1**, shut down helicopter and go to para 6-4-20.
	If **OIL HOT NOSE GRBX 1** indicator lights, and HOD displays a **121C** to **139C** oil temperature reading for **NGB1**, go to para 6-4-21.

GO TO NEXT PAGE

6-4-1. DRIVE SYSTEM - DYNAMIC OPERATIONAL CHECK (cont)

TASK	RESULT
11. On CPG ORT HOD, check FD/LS display for **XMN1** oil temperature reading.	If HOD displays a **140C** or more reading for **XMN1** oil temperature, shut down helicopter and go to para 6-4-22. If HOD displays a reading between **096C** and **139C** for **XMN1** oil temperature, go to para 6-4-23.
12. On pilot caution/warning panel, check **OIL HOT MAIN XMSN 1** indicator.	If **OIL HOT MAIN XMSN 1** indicator lights, and HOD displays a **070C** to **095C** temperature reading for **XMN1**, shut down helicopter and go to para 6-4-24. If **OIL HOT MAIN XMSN 1** indicator lights, and HOD displays a **096C** to **139C** oil temperature reading for **XMN1**, go to para 6-4-25.
13. On CPG ORT HOD, check FD/LS display for **XMN2** oil temperature reading.	If HOD displays a **140C** or more reading for **XMN2** oil temperature, shut down helicopter and go to para 6-4-26. If HOD displays a reading between **096C** and **139C** for **XMN2** oil temperature, go to para 6-4-27.
14. On pilot caution/warning panel, check **OIL HOT MAIN XMSN 2** indicator.	If **OIL HOT XMSN 2** indicator lights, and HOD displays a **070C** to **095C** temperature reading for **XMN2**, shut down helicopter and go to para 6-4-28. If **OIL HOT MAIN XMSN 2** indicator lights, and HOD displays a **096C** to **139C** temperature reading for **XMN2**, go to para 6-4-29.
15. On CPG ORT HOD, check FD/LS display for **NGB2** oil temperature reading.	If HOD displays a **140C** or more reading for **NGB2** oil temperature, shut down helicopter and go to para 6-4-30. If HOD displays a reading between 121C and **139C** for **NGB2** oil temperature, go to para 6-4-31.
16. On pilot caution/warning panel, check **OIL HOT NOSE GRBX 2** indicator.	If **OIL HOT NOSE GRBX 2** indicator lights, and HOD display a **103C** to **120C** temperature reading for NGB2, shut down helicopter and go to para 6-4-32. If **OIL HOT NOSE GRBX 2** indicator lights, and HOD displays a **121C** to **139C** oil temperature reading for **NGB2**, go to para 6-4-33.
17. On pilot caution/warning panel, check **CHIPS MAIN XMSN** indicator.	If **CHIPS MAIN XMSN** indicator lights, shut down helicopter and go to para 6-4-38.
18. On pilot caution/warning panel, check **CHIPS NOSE GRBX 1** indicator.	If **CHIPS NOSE GRBX 1** indicator lights, shut down helicopter and go to para 6-4-36.
19. On pilot caution/warning panel, check **CHIPS NOSE GRBX 2** indicator.	If **CHIPS NOSE GRBX 2** indicator lights, shut down helicopter and go to para 6-4-37.
20. On pilot caution/warning panel, check **TEMP INT** indicator.	If **TEMP INT** indicator lights, shut down helicopter and go to para 6-4-34.
21. On pilot caution/warning panel, check **TEMP TR** indicator.	If **TEMP TR** indicator lights, shut down helicopter and go to para 6-4-35.
22. Shut down helicopter (TM 55-1520-238-10).	
23. On engine nose gearboxes, check oil level in sight gage.	If engine nose gearbox oil loss is indicated, go to para 6-4-39.


CHIPS NOSE GRBX 1 INDICATOR
OIL HOT MAIN XMSN 1 INDICATOR
OIL HOT NOSE GRBX 1 INDICATOR
CHIPS MAIN XMSN INDICATOR
CHIPS NOSE GRBX 2 INDICATOR
OIL HOT MAIN XMSN 2 INDICATOR
OIL HOT NOSE GRBX 2 INDICATOR
TEMP INT INDICATOR
TEMP TR INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL
PRI MUX
SHAFT
VIB
HOT BAT
FUEL

PILOT CAUTION/WARNING PANEL

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6-4-1. DRIVE SYSTEM - DYNAMIC OPERATIONAL CHECK (cont)

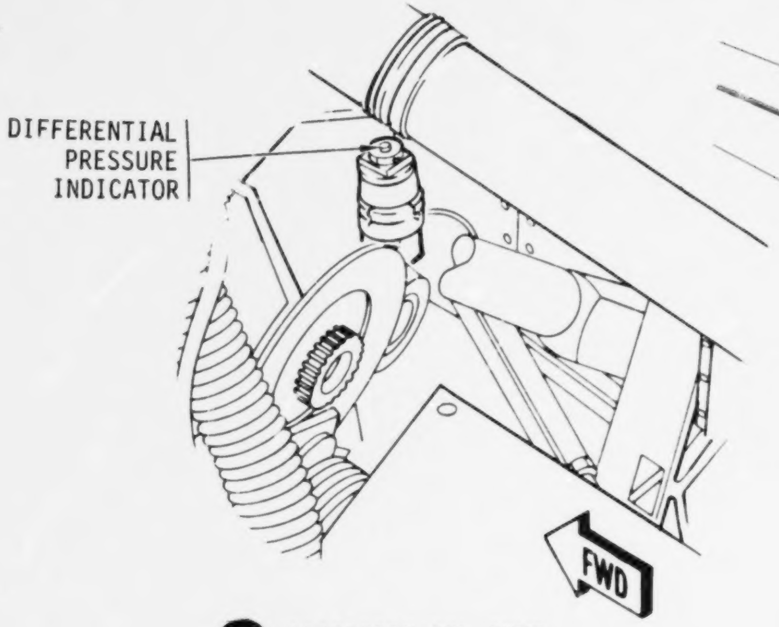
TASK	RESULT
24. Visually inspect differential pressure indicators located on left nose gearbox, right nose gearbox and accessory oil pump. Are all indicators in the retracted position?	If any indicator is extended, reset indicator and go to step 25.

NOTE

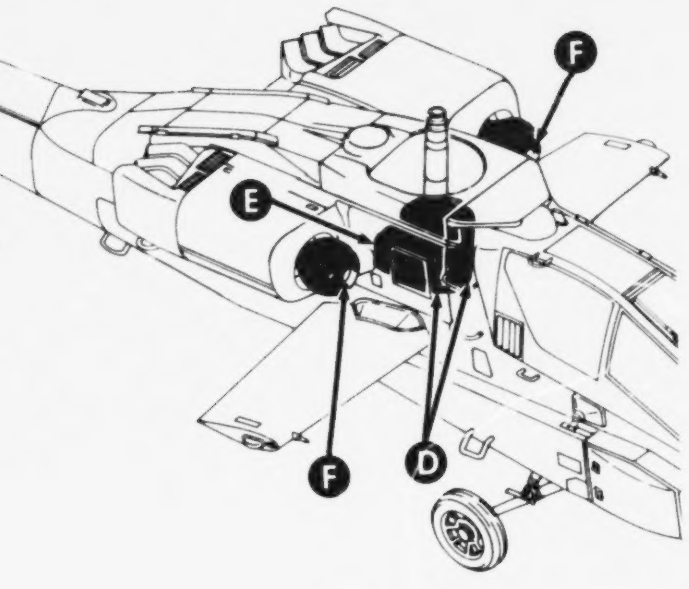
If all indicators remained retracted, go to step G.

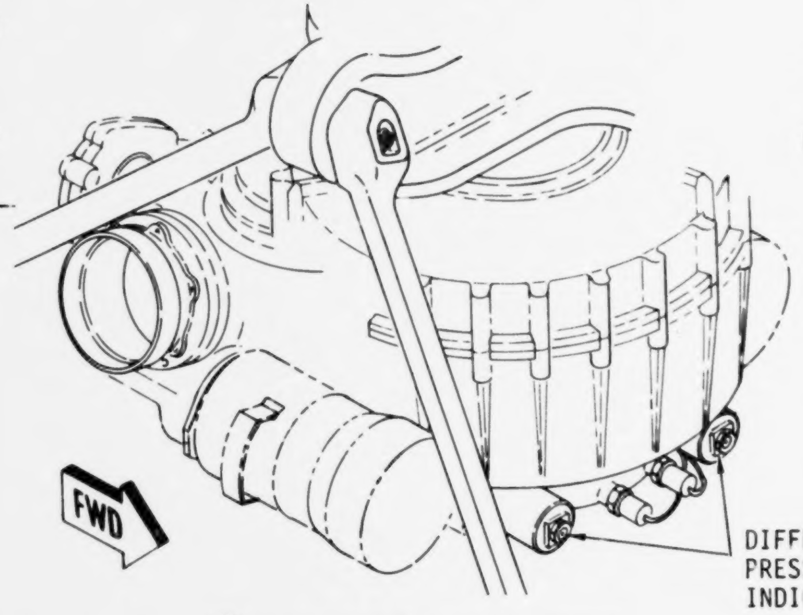
TASK	RESULT
25. Start/Operate engines 1 and 2 (TM 55-1520-238-10). Ground run at 100% N_R for five minutes.	
26. Shut down helicopter (TM 55-1520-238-10).	
27. Visually inspect differential pressure indicators located on left nose gearbox, right nose gearbox, and accessory oil pump. Are all indicators in the retracted position?	If indicator is extended, remove filter element (TM 55-1520-238-23) and check for contamination. If contaminated, replace filter element (TM 55-1520-238-23). If contamination is not present, replace differential pressure indicator (TM 55-1520-238-23).

G. Perform DRIVE SYSTEM - Power Down (para 6-1-5).

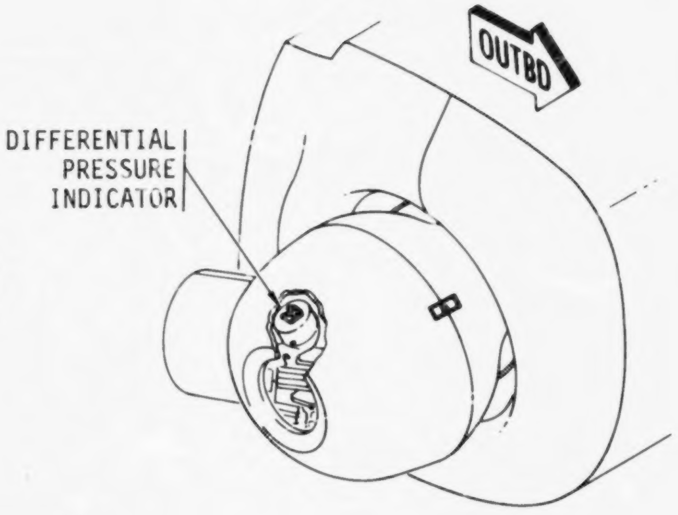

DIFFERENTIAL PRESSURE INDICATOR
FWD

E ACCESSORY OIL PUMP




FWD
DIFFERENTIAL PRESSURE INDICATORS

D MAIN TRANSMISSION (FRONT)


OUTBD
DIFFERENTIAL PRESSURE INDICATOR

F NOSE GEARBOX

MM04/1-967-3A

END OF TASK

6-4-2. HOD NGB1 READING - DISPLAYS 28LB OR LESS OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Powertrain	5180-00-003-5267
Multimeter AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

68F10 Aircraft Electrician
68D10 Powertrain Repairer
100KG Pilot

References:

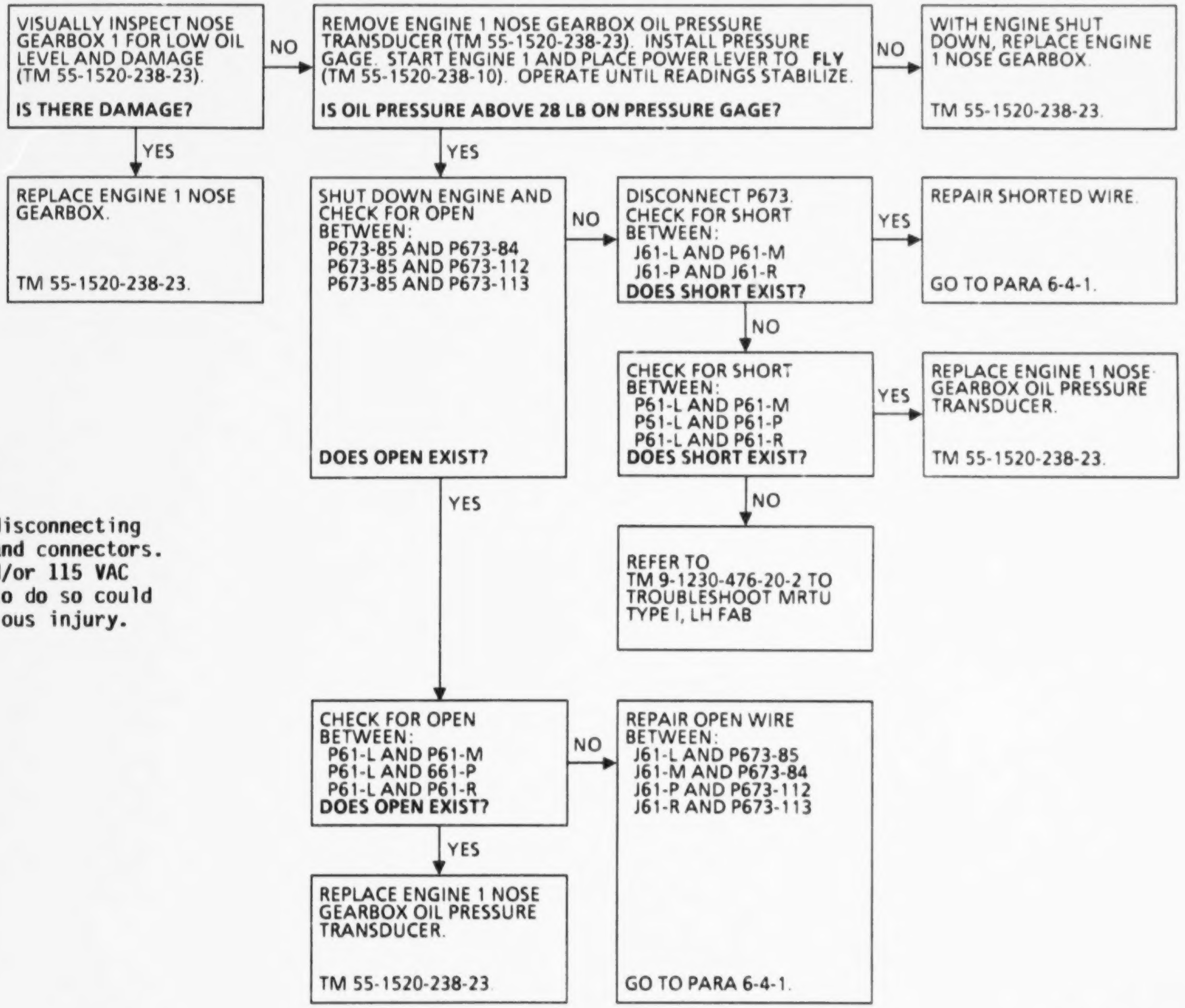
TM 9-1230-476-20-2
TM 55-1520-238-10
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 access door and LN6, L60 fairings open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



VISUALLY INSPECT NOSE GEARBOX 1 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).
IS THERE DAMAGE?

REPLACE ENGINE 1 NOSE GEARBOX.
TM 55-1520-238-23.

REMOVE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-10). OPERATE UNTIL READINGS STABILIZE.
IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?

WITH ENGINE SHUT DOWN, REPLACE ENGINE 1 NOSE GEARBOX.
TM 55-1520-238-23.

SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P673-85 AND P673-84
P673-85 AND P673-112
P673-85 AND P673-113
DOES OPEN EXIST?

DISCONNECT P673. CHECK FOR SHORT BETWEEN:
J61-L AND P61-M
J61-P AND J61-R
DOES SHORT EXIST?

REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.

CHECK FOR SHORT BETWEEN:
P61-L AND P61-M
P61-L AND P61-P
P61-L AND P61-R
DOES SHORT EXIST?

REPLACE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, LH FAB

CHECK FOR OPEN BETWEEN:
P61-L AND P61-M
P61-L AND 661-P
P61-L AND P61-R
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
J61-L AND P673-85
J61-M AND P673-84
J61-P AND P673-112
J61-R AND P673-113
GO TO PARA 6-4-1.

REPLACE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23

END OF TASK

6-4-3. HOD NGB1 READING - DISPLAYS LOW OIL PRESSURE

Personnel Required:

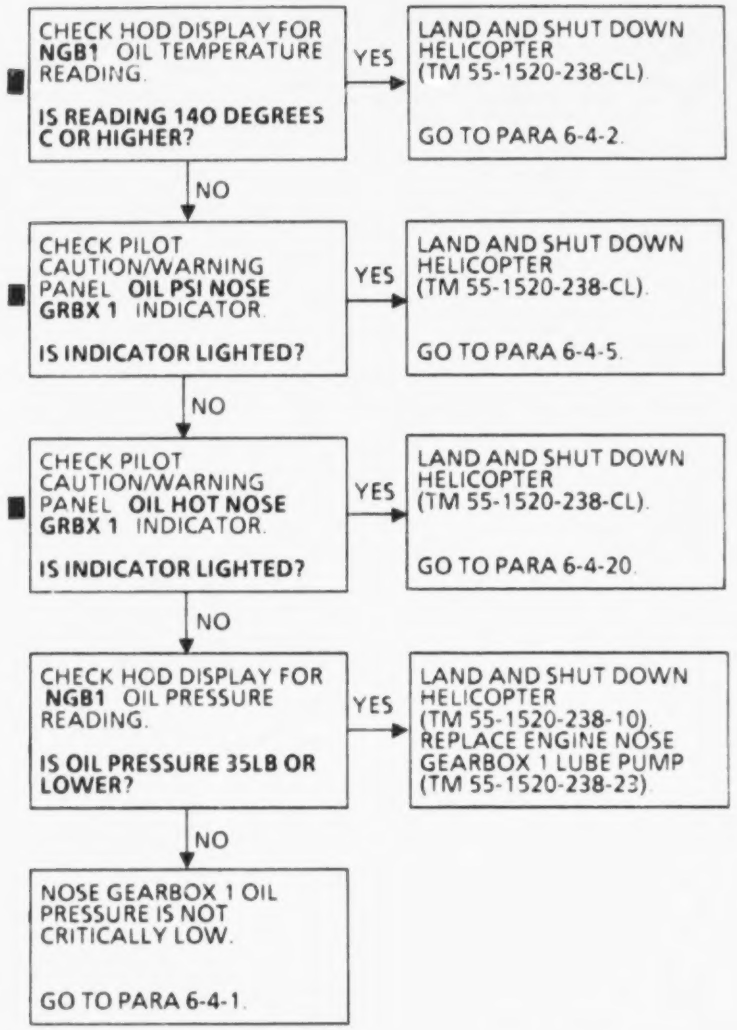
67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-10	Helicopter in hover


CHECK HOD DISPLAY FOR NGB1 OIL TEMPERATURE READING.
IS READING 140 DEGREES C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL).
GO TO PARA 6-4-2.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL PSI NOSE GRBX 1 INDICATOR.
IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL).
GO TO PARA 6-4-5.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL HOT NOSE GRBX 1 INDICATOR.
IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL).
GO TO PARA 6-4-20.
NO
CHECK HOD DISPLAY FOR NGB1 OIL PRESSURE READING.
IS OIL PRESSURE 35LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE ENGINE NOSE GEARBOX 1 LUBE PUMP (TM 55-1520-238-23).
NO
NOSE GEARBOX 1 OIL PRESSURE IS NOT CRITICALLY LOW.
GO TO PARA 6-4-1.

END OF TASK

6-4-4. OIL PSI NOSE GRBX 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL NGB1 OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

100KG	Pilot
68F10	Aircraft Electrician
67R10	Attack Helicopter Repairer

References:

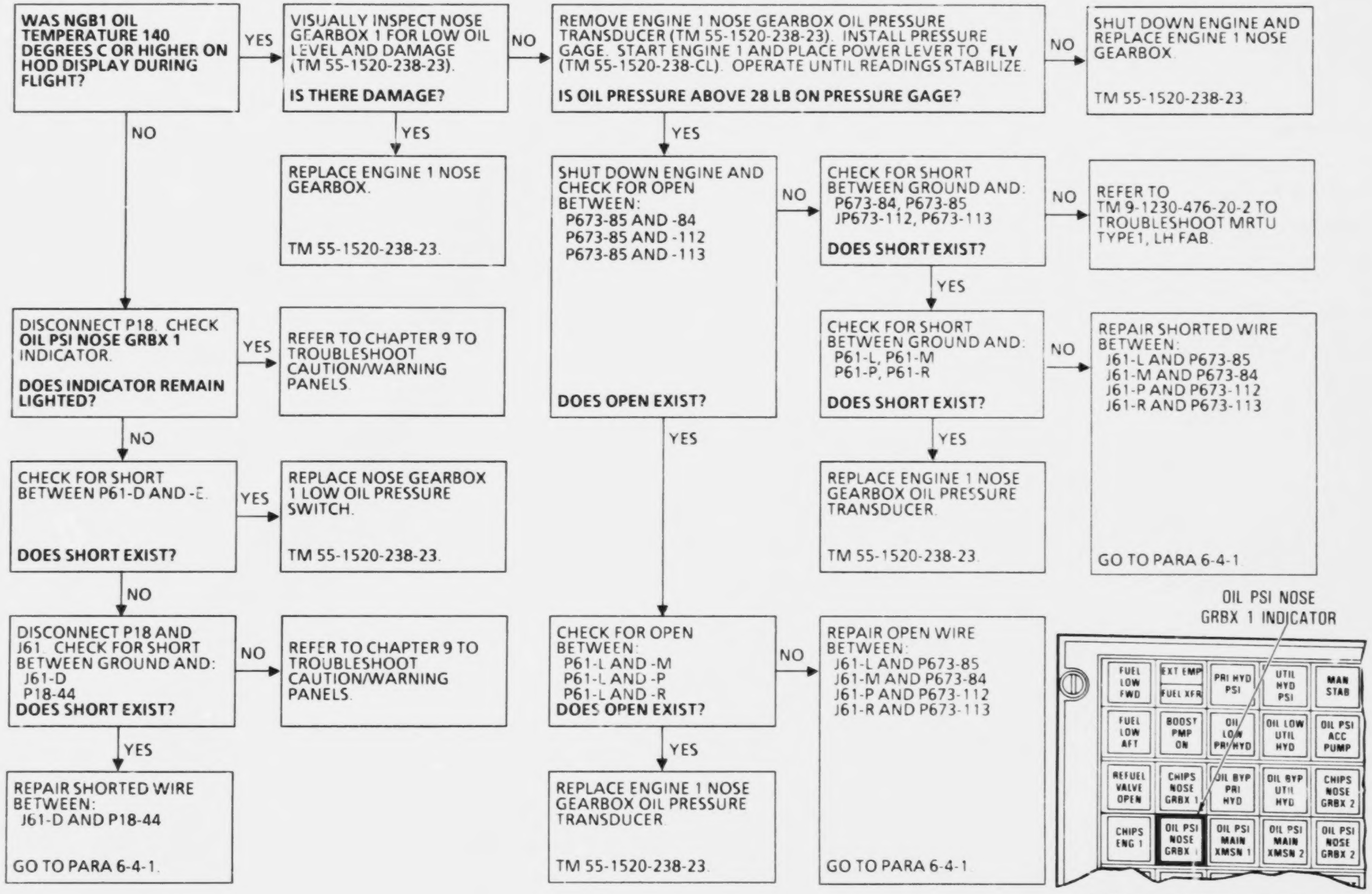
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


WAS NGB1 OIL TEMPERATURE 140 DEGREES C OR HIGHER ON HOD DISPLAY DURING FLIGHT?
YES
VISUALLY INSPECT NOSE GEARBOX 1 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
NO
REMOVE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO FLY (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE. IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?
NO
SHUT DOWN ENGINE AND REPLACE ENGINE 1 NOSE GEARBOX. TM 55-1520-238-23.
NO
YES
REPLACE ENGINE 1 NOSE GEARBOX. TM 55-1520-238-23.
YES
SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN: P673-85 AND -84 P673-85 AND -112 P673-85 AND -113 DOES OPEN EXIST?
NO
CHECK FOR SHORT BETWEEN GROUND AND: P673-84, P673-85 JP673-112, P673-113 DOES SHORT EXIST?
NO
REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE1, LH FAB.
YES
CHECK FOR SHORT BETWEEN GROUND AND: P61-L, P61-M P61-P, P61-R DOES SHORT EXIST?
NO
REPAIR SHORTED WIRE BETWEEN: J61-L AND P673-85 J61-M AND P673-84 J61-P AND P673-112 J61-R AND P673-113 GO TO PARA 6-4-1
YES
REPLACE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER. TM 55-1520-238-23.
DISCONNECT P18. CHECK OIL PSI NOSE GRBX 1 INDICATOR. DOES INDICATOR REMAIN LIGHTED?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
NO
CHECK FOR SHORT BETWEEN P61-D AND -E. DOES SHORT EXIST?
YES
REPLACE NOSE GEARBOX 1 LOW OIL PRESSURE SWITCH. TM 55-1520-238-23.
NO
DISCONNECT P18 AND J61. CHECK FOR SHORT BETWEEN GROUND AND: J61-D P18-44 DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE BETWEEN: J61-D AND P18-44 GO TO PARA 6-4-1.
YES
CHECK FOR OPEN BETWEEN: P61-L AND -M P61-L AND -P P61-L AND -R DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN: J61-L AND P673-85 J61-M AND P673-84 J61-P AND P673-112 J61-R AND P673-113 GO TO PARA 6-4-1.
YES
REPLACE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER TM 55-1520-238-23.
OIL PSI NOSE GRBX 1 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2

PILOT CAUTION/WARNING PANEL

MM04/1-1117A

END OF TASK

6-4-5. OIL PSI NOSE GRBX 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS LOW NGB1 OIL PRESSURE

Personnel Required:

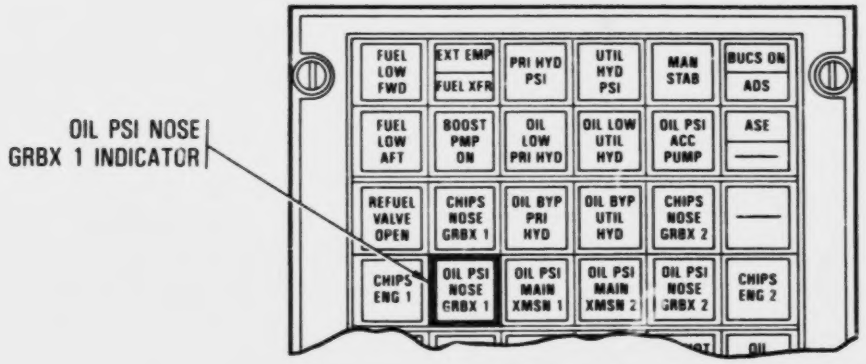
68D10 Aircraft Powertrain Repairer
100KG Pilot
66R30 Inspector/Supervisor
To assist pilot during test flight

References:

TM 55-1520-238-10
TM 55-1520-238-23

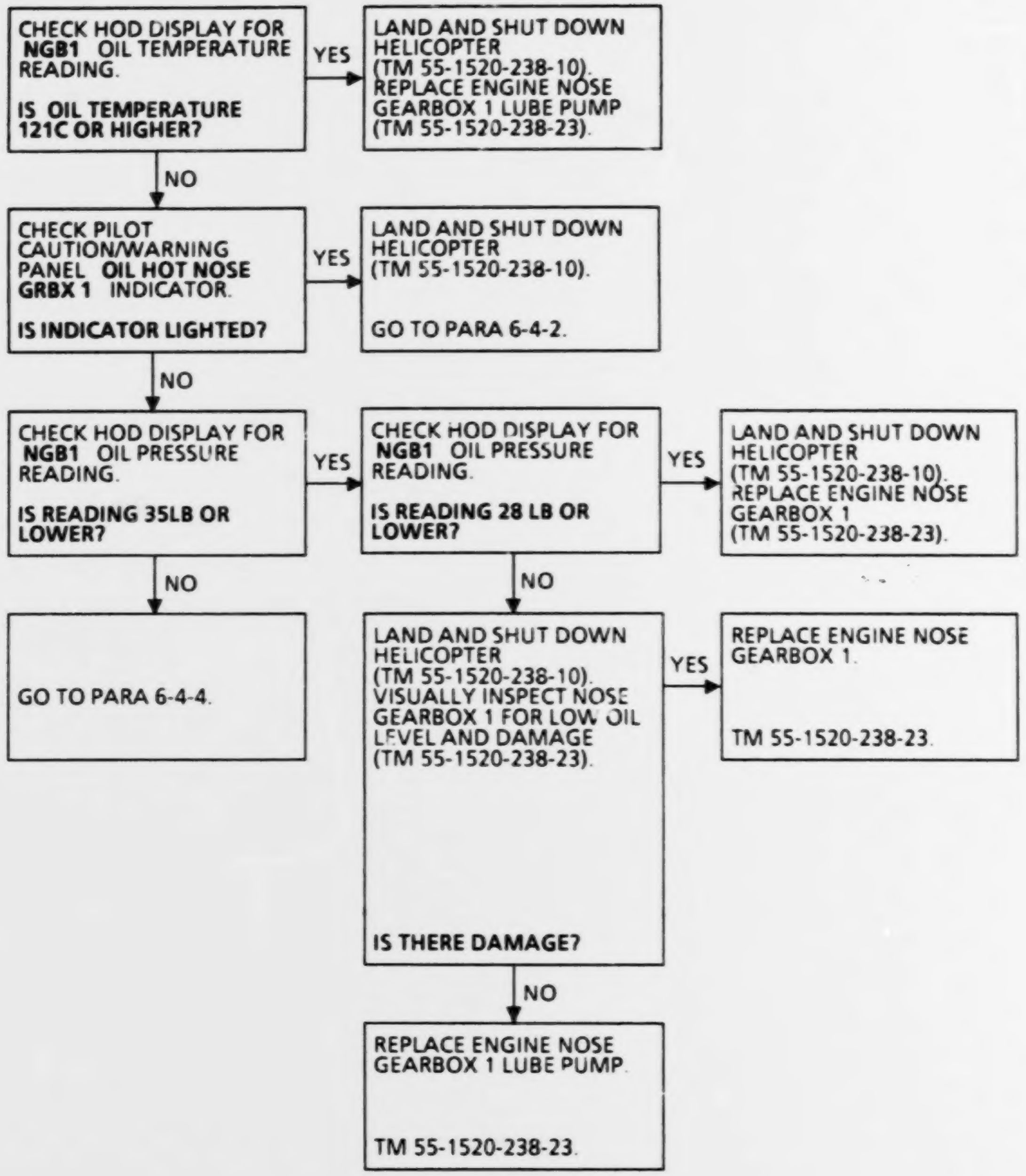
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-10	Helicopter in hover


OIL PSI NOSE GRBX 1 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL

PILOT CAUTION/WARNING PANEL

MM04/1-1118



CHECK HOD DISPLAY FOR **NGB1** OIL TEMPERATURE READING.

IS OIL TEMPERATURE 121C OR HIGHER?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE ENGINE NOSE GEARBOX 1 LUBE PUMP (TM 55-1520-238-23).

NO: CHECK PILOT CAUTION/WARNING PANEL **OIL HOT NOSE GRBX 1** INDICATOR.

IS INDICATOR LIGHTED?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). GO TO PARA 6-4-2.

NO: CHECK HOD DISPLAY FOR **NGB1** OIL PRESSURE READING.

IS READING 35LB OR LOWER?

NO: GO TO PARA 6-4-4.

YES: CHECK HOD DISPLAY FOR **NGB1** OIL PRESSURE READING.

IS READING 28 LB OR LOWER?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE ENGINE NOSE GEARBOX 1 (TM 55-1520-238-23).

NO: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). VISUALLY INSPECT NOSE GEARBOX 1 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).

IS THERE DAMAGE?

YES: REPLACE ENGINE NOSE GEARBOX 1. TM 55-1520-238-23.

NO: REPLACE ENGINE NOSE GEARBOX 1 LUBE PUMP. TM 55-1520-238-23.

END OF TASK

6-4-6. HOD SMN1 READING - DISPLAYS 29LB OR LESS OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

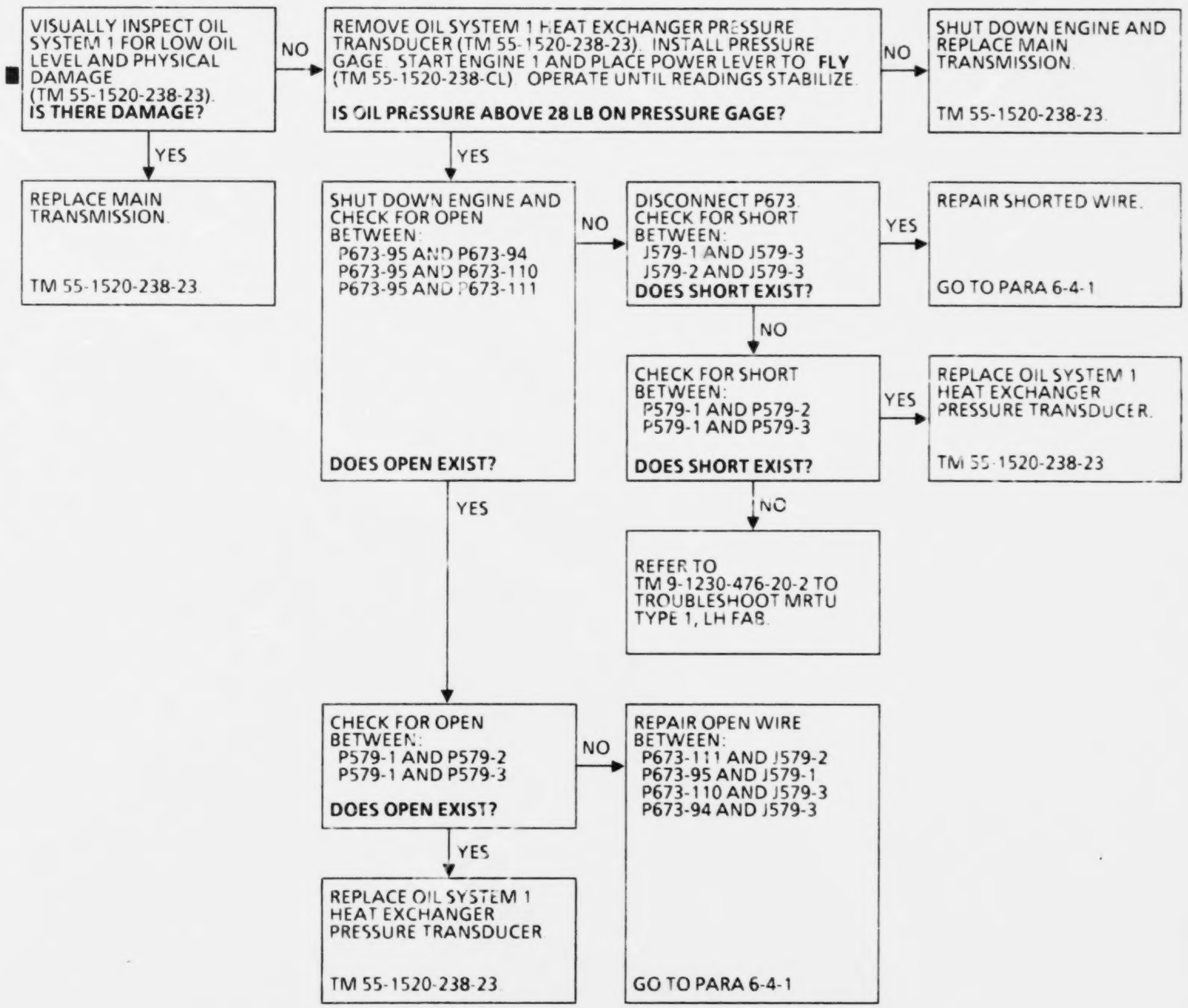
67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L225 door opened and L200 panel removed
Para 1-3-2	ICS connected



VISUALLY INSPECT OIL SYSTEM 1 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23). **IS THERE DAMAGE?**

REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.

REMOVE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE. **IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?**

SHUT DOWN ENGINE AND REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.

SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P673-95 AND P673-94
P673-95 AND P673-110
P673-95 AND P673-111
DOES OPEN EXIST?

DISCONNECT P673. CHECK FOR SHORT BETWEEN:
J579-1 AND J579-3
J579-2 AND J579-3
DOES SHORT EXIST?

REPAIR SHORTED WIRE. GO TO PARA 6-4-1

CHECK FOR SHORT BETWEEN:
P579-1 AND P579-2
P579-1 AND P579-3
DOES SHORT EXIST?

REPLACE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER. TM 55-1520-238-23

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE 1, LH FAB.

CHECK FOR OPEN BETWEEN:
P579-1 AND P579-2
P579-1 AND P579-3
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
P673-111 AND J579-2
P673-95 AND J579-1
P673-110 AND J579-3
P673-94 AND J579-3
GO TO PARA 6-4-1

REPLACE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER. TM 55-1520-238-23

END OF TASK

6-4-7. HOD XMN1 READING - DISPLAYS LOW OIL PRESSURE

Personnel Required:

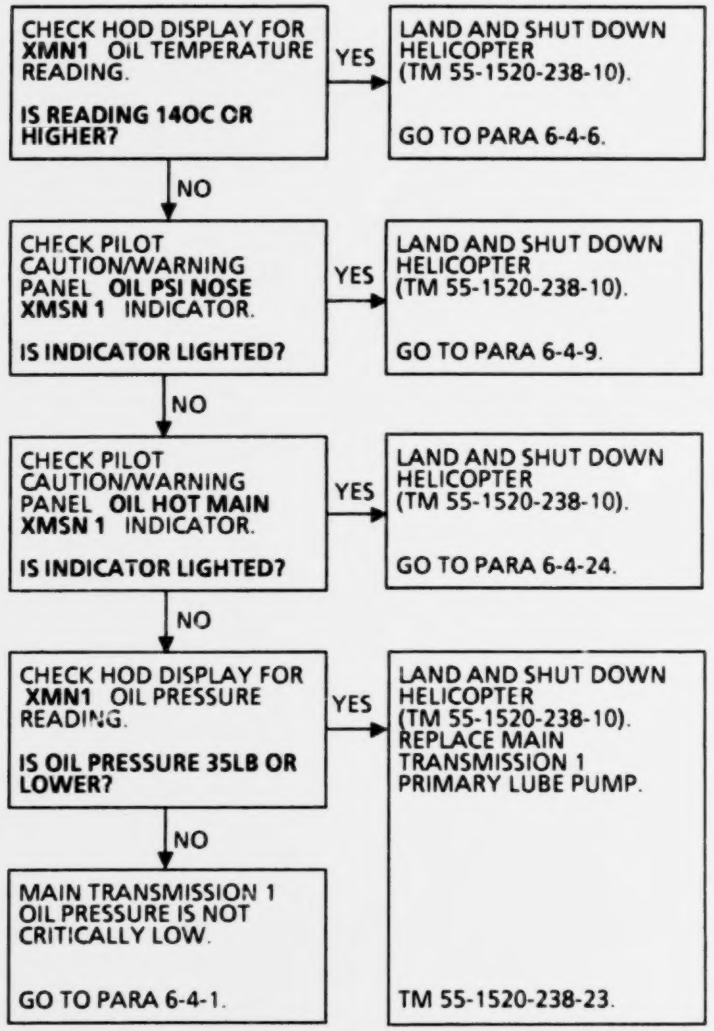
68D10	Aircraft Powertrain Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-10
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-10	Helicopter in hover



CHECK HOD DISPLAY FOR **XMN1** OIL TEMPERATURE READING.

IS READING 140C OR HIGHER?

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10).

GO TO PARA 6-4-6.

CHECK PILOT CAUTION/WARNING PANEL **OIL PSI NOSE XMSN 1** INDICATOR.

IS INDICATOR LIGHTED?

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10).

GO TO PARA 6-4-9.

CHECK PILOT CAUTION/WARNING PANEL **OIL HOT MAIN XMSN 1** INDICATOR.

IS INDICATOR LIGHTED?

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10).

GO TO PARA 6-4-24.

CHECK HOD DISPLAY FOR **XMN1** OIL PRESSURE READING.

IS OIL PRESSURE 35LB OR LOWER?

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE MAIN TRANSMISSION 1 PRIMARY LUBE PUMP.

TM 55-1520-238-23.

MAIN TRANSMISSION 1 OIL PRESSURE IS NOT CRITICALLY LOW.

GO TO PARA 6-4-1.

END OF TASK

6-4-8. OIL PSI MAIN XMSN 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL XMN1 OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

DISCONNECT P18.

IS OIL PSI MAIN XMSN 1 INDICATOR LIGHTED (SEE NOTE)

YES

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

NO

DISCONNECT P755. CHECK FOR SHORT BETWEEN P18-9 AND GROUND.

DOES SHORT EXIST?

YES

REPAIR SHORTED WIRE BETWEEN P18-9 AND P755-25.

GO TO PARA 6-4-1.

NO

CHECK FOR OPEN BETWEEN:
P18-9 AND P456-A7
J456-A7 AND P156-J5
P455-26 AND GS572-D

DOES OPEN EXIST?

YES

REPAIR OPEN WIRE.

GO TO PARA 6-4-1.

NO

RECONNECT P18 AND P755. CHECK FOR OPEN BETWEEN J456-A7 AND GS572-D.

DOES OPEN EXIST?

YES

REPLACE MAIN XMSN OIL SYSTEM 1 OIL PRESSURE SWITCH.

TM 55-1520-238-23.

NO

RECONNECT P18 AND P755. REMOVE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE.

DOES OIL PRESSURE GAGE READ ABOVE 28 LBS?

NO

SHUT DOWN ENGINE AND REPLACE SYSTEM 1 MAIN TRANSMISSION PUMP.

TM 55-1520-238-23.

YES

SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P673-95 AND -94
P673-95 AND -110
P673-95 AND -111

DOES OPEN EXIST?

YES

CHECK FOR OPEN BETWEEN:
P579-1 AND -2
P579-1 AND -3

DOES OPEN EXIST?

YES

REPLACE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER.

TM 55-1520-238-23.

NO

REPAIR OPEN WIRE BETWEEN:
P673-95 AND J579-1
P673-111 AND J579-2
P673-110 AND J579-3
P673-94 AND J579-3

GO TO PARA 6-4-1.

NO

CHECK FOR SHORT BETWEEN GROUND AND:
P673-94, -95, -110, AND -111.

DOES SHORT EXIST?

NO

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, LH FAB.

YES

DISCONNECT J579. CHECK FOR SHORT BETWEEN GROUND AND:
P579-1, -2, AND -3.

DOES SHORT EXIST?

YES

REPLACE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER.

TM 55-1520-238-23.

NO

REPAIR SHORTED WIRE BETWEEN:
P673-95 AND J579-1
P673-111 AND J579-2
P673-110 AND J579-3
P673-94 AND J579-3

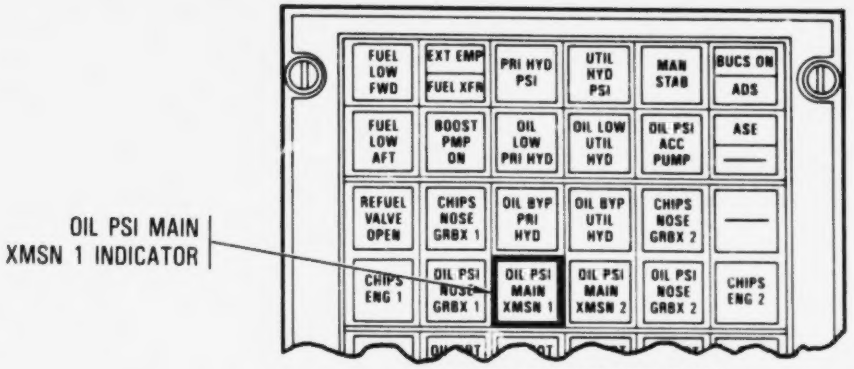
GO TO PARA 6-4-1.

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

NOTE

Verify transmission system operating temperature is normal during flight. Low oil pressure may have resulted from high NGB1 oil temperature.


OIL PSI MAIN XMSN 1 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2

PILOT CAUTION/WARNING PANEL

MM04/1-1119

END OF TASK

268-454

6-4-9. OIL PSI MAIN XMSN 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS LOW XMN1 OIL PRESSURE

Personnel Required:

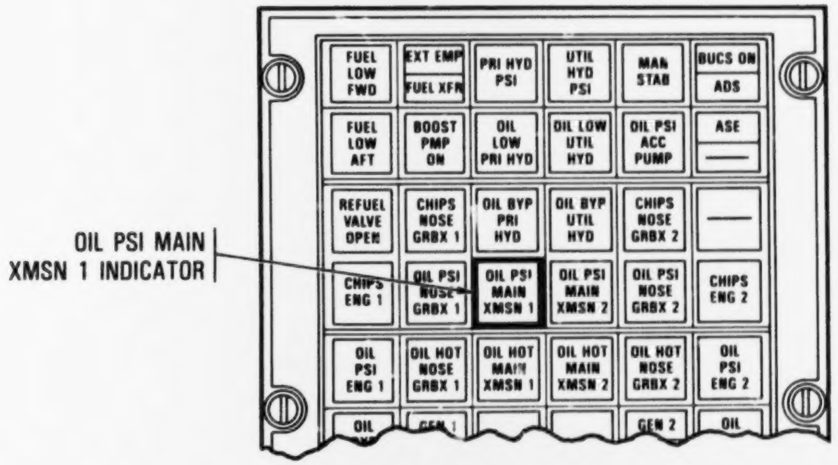
68D10	Aircraft Powertrain Repairer
100KG	Pilot
67R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-10
TM 55-1520-238-23

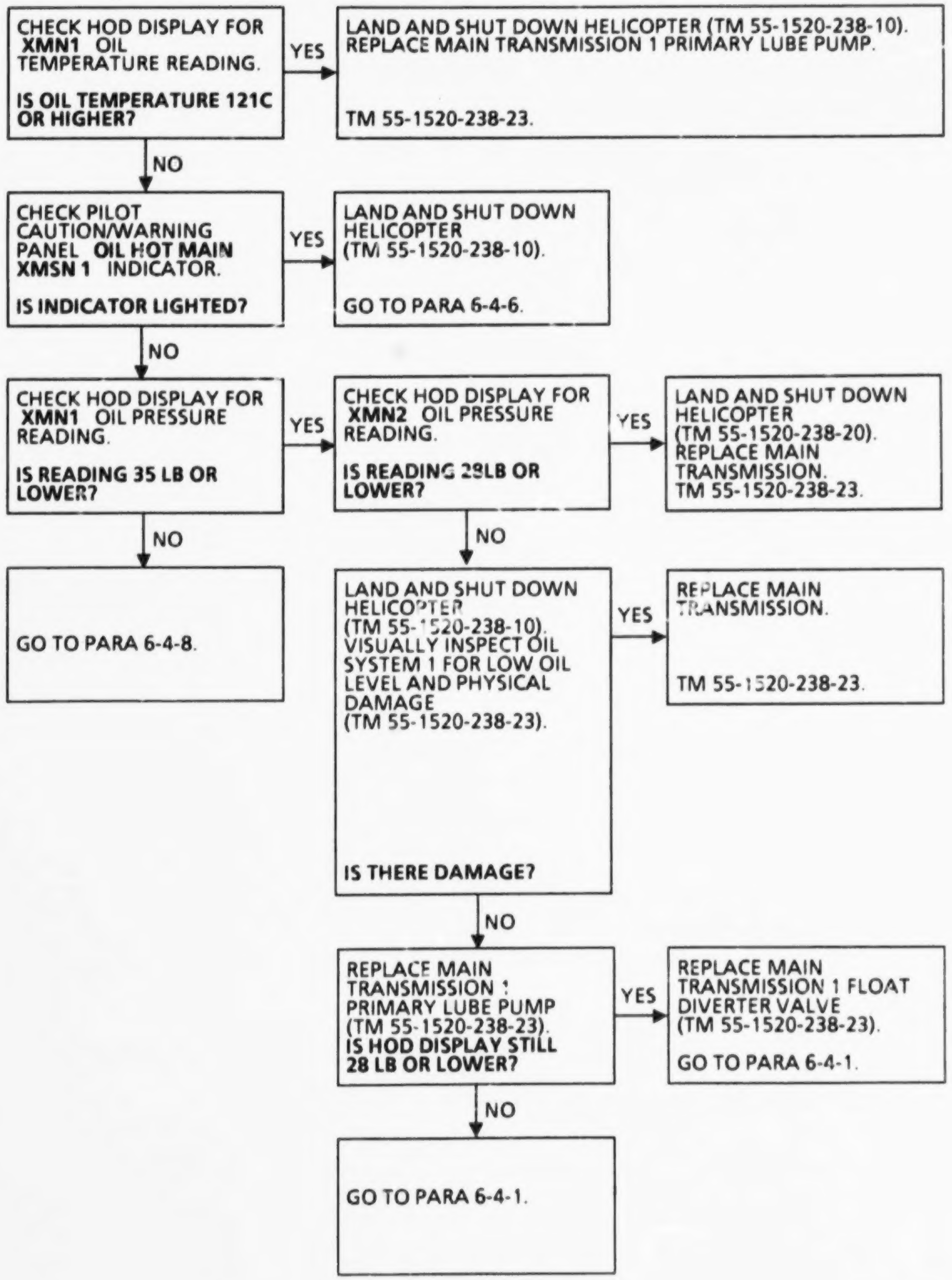
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-10	Helicopter in hover


OIL PSI MAIN XMSN 1 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL
GEN 1
GEN 2
OIL

PILOT CAUTION/WARNING PANEL

MM04/1-1120


CHECK HOD DISPLAY FOR XMN1 OIL TEMPERATURE READING. IS OIL TEMPERATURE 121C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE MAIN TRANSMISSION 1 PRIMARY LUBE PUMP. TM 55-1520-238-23.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL HOT MAIN XMSN 1 INDICATOR. IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). GO TO PARA 6-4-6.
NO
CHECK HOD DISPLAY FOR XMN1 OIL PRESSURE READING. IS READING 35 LB OR LOWER?
YES
CHECK HOD DISPLAY FOR XMN2 OIL PRESSURE READING. IS READING 28LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-20). REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.
NO
GO TO PARA 6-4-8.
NO
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). VISUALLY INSPECT OIL SYSTEM 1 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
YES
REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.
NO
REPLACE MAIN TRANSMISSION 1 PRIMARY LUBE PUMP (TM 55-1520-238-23). IS HOD DISPLAY STILL 28 LB OR LOWER?
YES
REPLACE MAIN TRANSMISSION 1 FLOAT DIVERTER VALVE (TM 55-1520-238-23). GO TO PARA 6-4-1.
NO
GO TO PARA 6-4-1.

END OF TASK

6-4-10. HOD XMN2 READING - DISPLAYS 28LB OR LESS OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

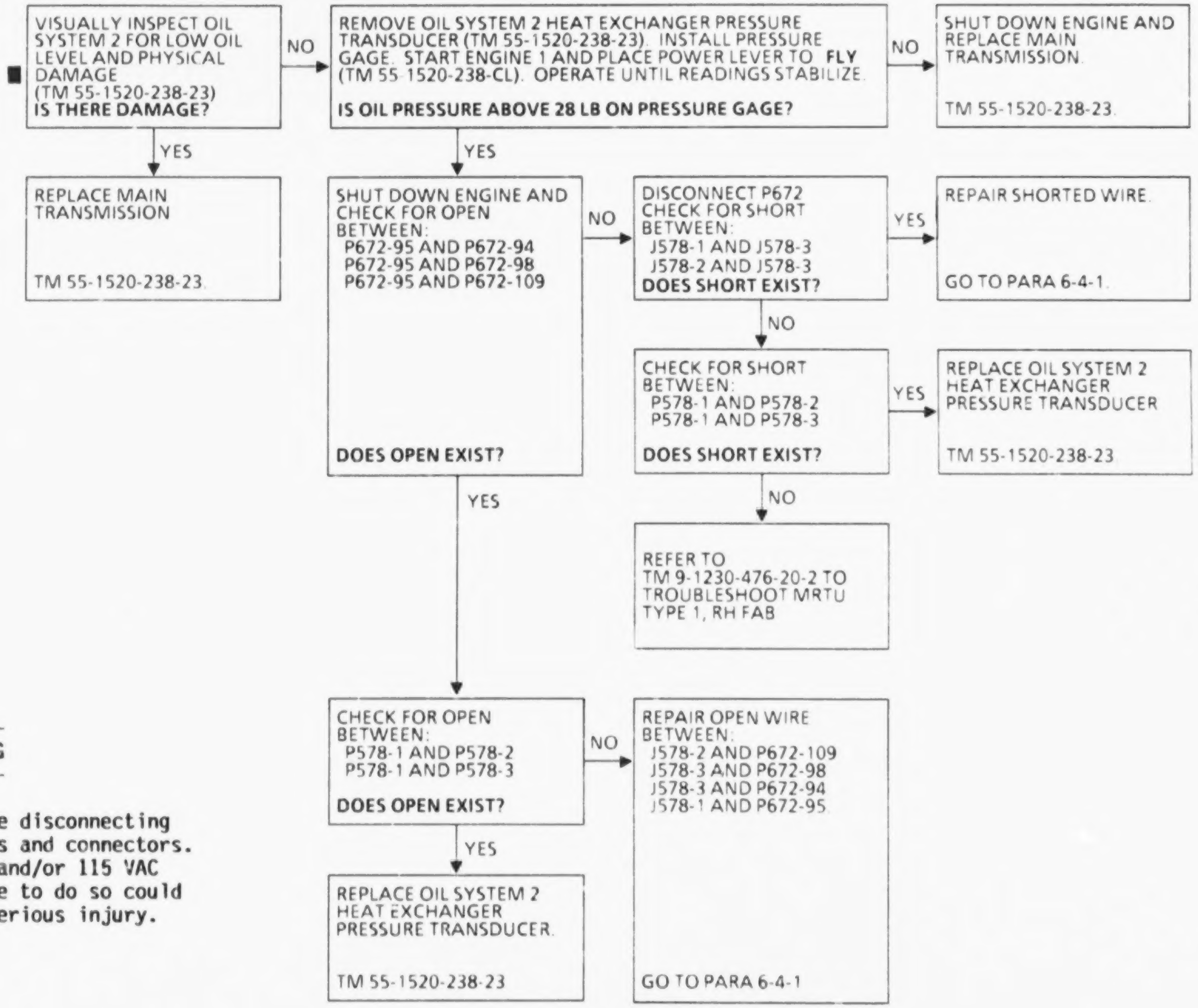
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R225 door opened and R200 panel removed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



VISUALLY INSPECT OIL SYSTEM 2 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23) **IS THERE DAMAGE?**

REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.

REMOVE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE. **IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?**

SHUT DOWN ENGINE AND REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.

SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P672-95 AND P672-94
P672-95 AND P672-98
P672-95 AND P672-109
DOES OPEN EXIST?

DISCONNECT P672 CHECK FOR SHORT BETWEEN:
J578-1 AND J578-3
J578-2 AND J578-3
DOES SHORT EXIST?

REPAIR SHORTED WIRE. GO TO PARA 6-4-1.

CHECK FOR SHORT BETWEEN:
P578-1 AND P578-2
P578-1 AND P578-3
DOES SHORT EXIST?

REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER. TM 55-1520-238-23.

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE 1, RH FAB

CHECK FOR OPEN BETWEEN:
P578-1 AND P578-2
P578-1 AND P578-3
DOES OPEN EXIST?

REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER. TM 55-1520-238-23

REPAIR OPEN WIRE BETWEEN:
J578-2 AND P672-109
J578-3 AND P672-98
J578-3 AND P672-94
J578-1 AND P672-95
GO TO PARA 6-4-1

END OF TASK

6-4-11. HOD XMN2 READING - DISPLAYS LOW OIL PRESSURE

Personnel Required:

68D10	Aircraft Powertrain Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

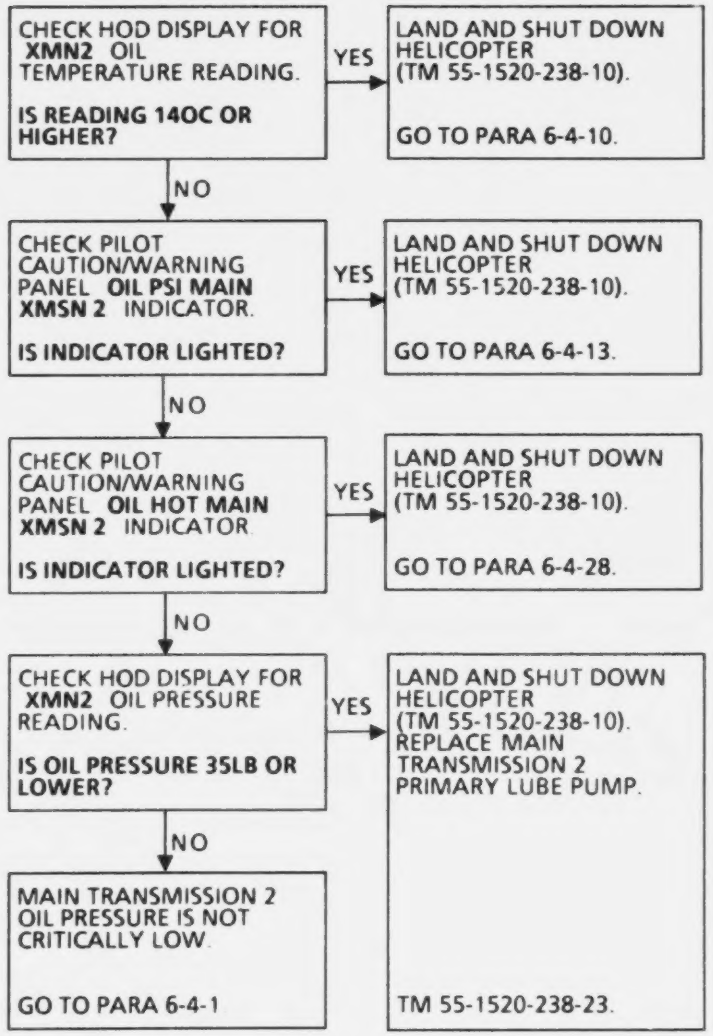
TM 55-1520-238-10
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-10	Helicopter in hover

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK HOD DISPLAY FOR **XMN2** OIL TEMPERATURE READING.
IS READING 140C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10).
GO TO PARA 6-4-10.
NO
CHECK PILOT CAUTION/WARNING PANEL **OIL PSI MAIN XMSN 2** INDICATOR.
IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10).
GO TO PARA 6-4-13.
NO
CHECK PILOT CAUTION/WARNING PANEL **OIL HOT MAIN XMSN 2** INDICATOR.
IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10).
GO TO PARA 6-4-28.
NO
CHECK HOD DISPLAY FOR **XMN2** OIL PRESSURE READING.
IS OIL PRESSURE 35LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE MAIN TRANSMISSION 2 PRIMARY LUBE PUMP.
TM 55-1520-238-23.
NO
MAIN TRANSMISSION 2 OIL PRESSURE IS NOT CRITICALLY LOW.
GO TO PARA 6-4-1

END OF TASK

6-4-10. HOD XMN2 READING - DISPLAYS 28LB OR LESS OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

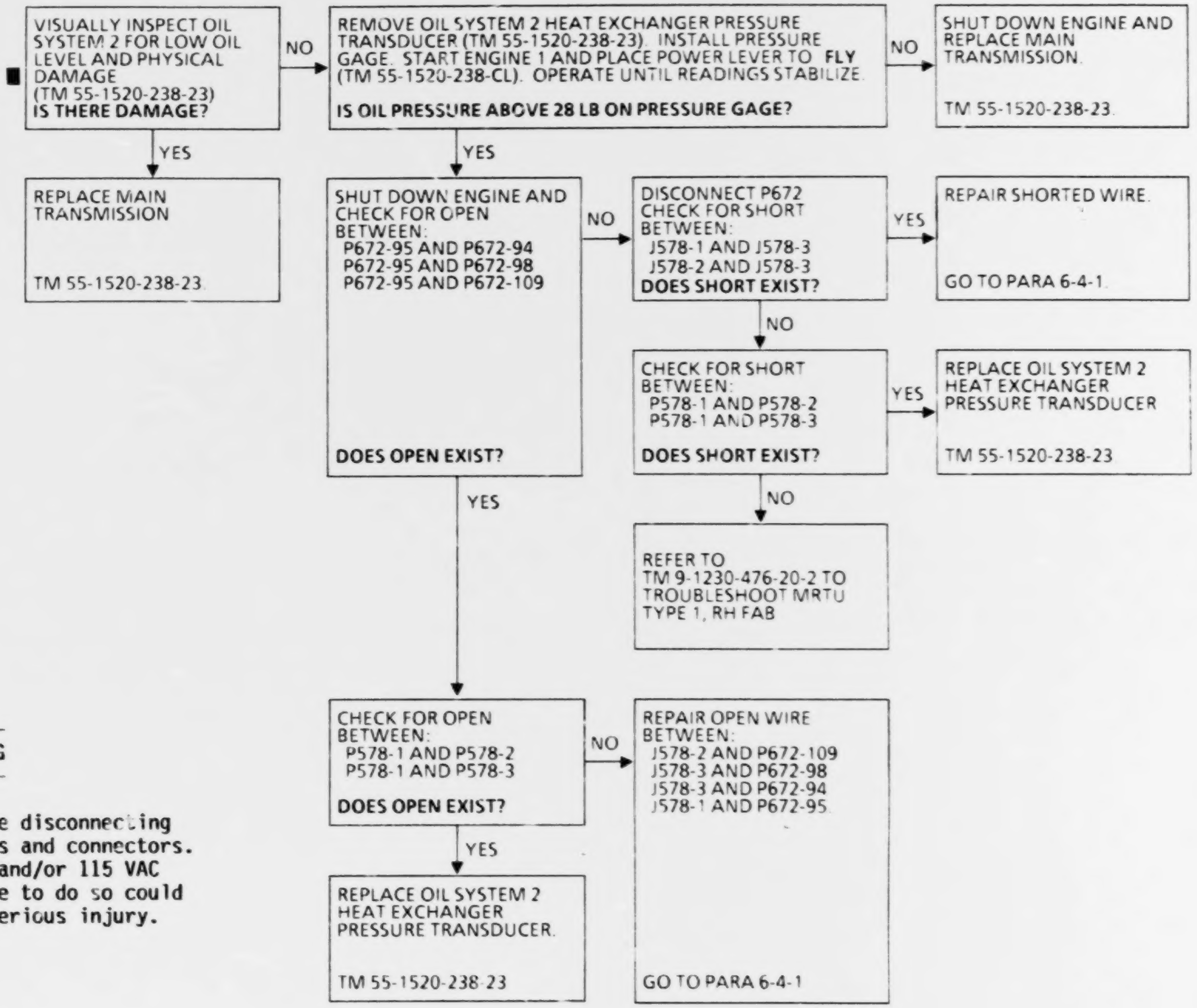
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R225 door opened and R200 panel removed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



VISUALLY INSPECT OIL SYSTEM 2 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23)
IS THERE DAMAGE?

REPLACE MAIN TRANSMISSION

TM 55-1520-238-23.

REMOVE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE.

IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?

SHUT DOWN ENGINE AND REPLACE MAIN TRANSMISSION.

TM 55-1520-238-23.

SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P672-95 AND P672-94
P672-95 AND P672-98
P672-95 AND P672-109

DOES OPEN EXIST?

DISCONNECT P672
CHECK FOR SHORT BETWEEN:
J578-1 AND J578-3
J578-2 AND J578-3
DOES SHORT EXIST?

REPAIR SHORTED WIRE.

GO TO PARA 6-4-1.

CHECK FOR SHORT BETWEEN:
P578-1 AND P578-2
P578-1 AND P578-3

DOES SHORT EXIST?

REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER

TM 55-1520-238-23

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE 1, RH FAB

CHECK FOR OPEN BETWEEN:
P578-1 AND P578-2
P578-1 AND P578-3

DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
J578-2 AND P672-109
J578-3 AND P672-98
J578-3 AND P672-94
J578-1 AND P672-95.

GO TO PARA 6-4-1

REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER.

TM 55-1520-238-23

END OF TASK

6-4-12. OIL PSI MAIN XMSN 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL XMN2 OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician
100KG Pilot

References:

TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

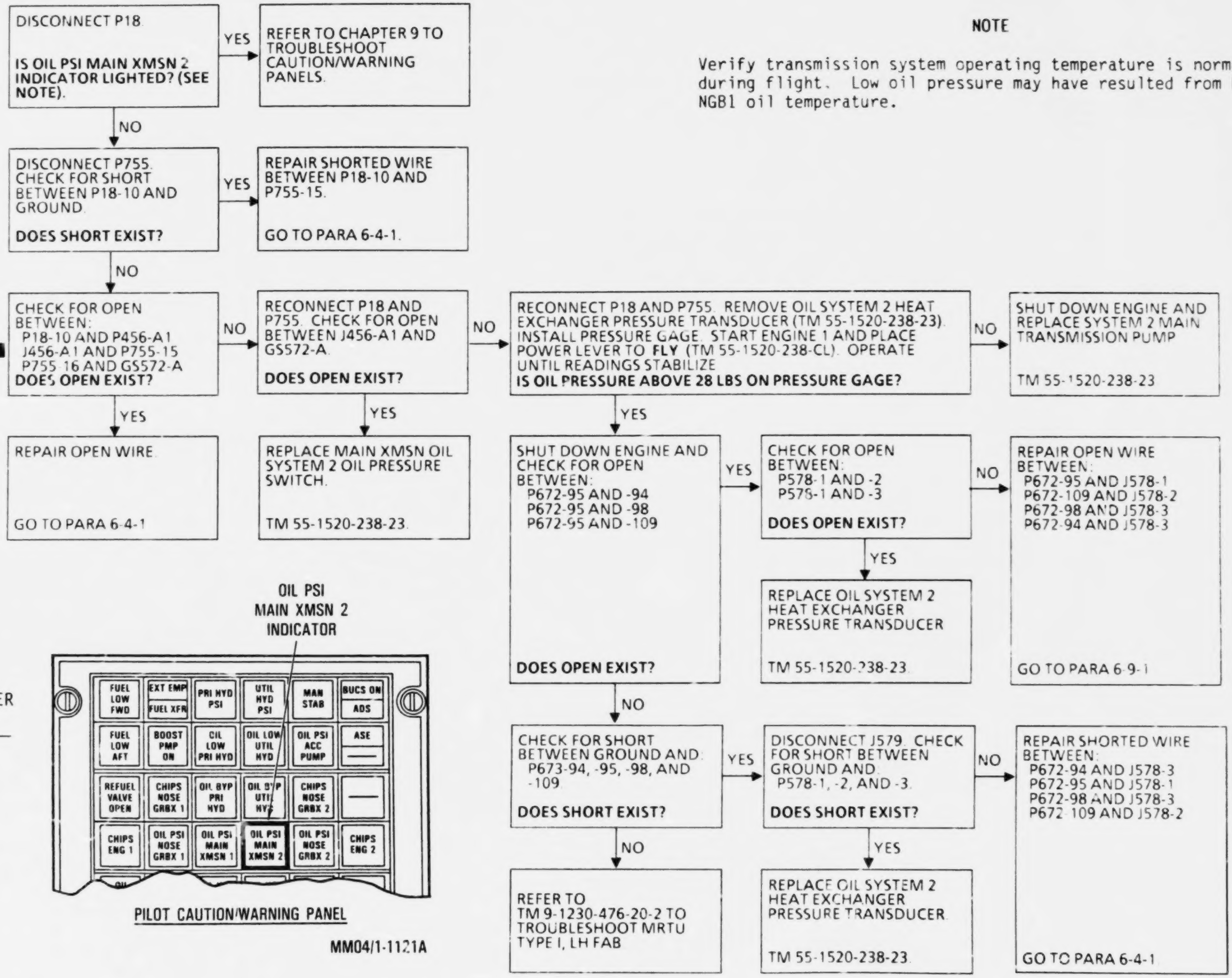
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

NOTE

Verify transmission system operating temperature is normal during flight. Low oil pressure may have resulted from high NGB1 oil temperature.



DISCONNECT P18.
IS OIL PSI MAIN XMSN 2 INDICATOR LIGHTED? (SEE NOTE).

YES: REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

NO: DISCONNECT P755. CHECK FOR SHORT BETWEEN P18-10 AND GROUND.
DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN P18-10 AND P755-15.
GO TO PARA 6-4-1.

NO: CHECK FOR OPEN BETWEEN:
P18-10 AND P456-A1
J456-A1 AND P755-15
P755-16 AND GS572-A
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE.
GO TO PARA 6-4-1.

NO: RECONNECT P18 AND P755. CHECK FOR OPEN BETWEEN J456-A1 AND GS572-A.
DOES OPEN EXIST?

YES: REPLACE MAIN XMSN OIL SYSTEM 2 OIL PRESSURE SWITCH.
TM 55-1520-238-23.

NO: RECONNECT P18 AND P755. REMOVE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE.
IS OIL PRESSURE ABOVE 28 LBS ON PRESSURE GAGE?

NO: SHUT DOWN ENGINE AND REPLACE SYSTEM 2 MAIN TRANSMISSION PUMP.
TM 55-1520-238-23

YES: SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P672-95 AND -94
P672-95 AND -98
P672-95 AND -109
DOES OPEN EXIST?

YES: CHECK FOR OPEN BETWEEN:
P578-1 AND -2
P578-1 AND -3
DOES OPEN EXIST?

YES: REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER
TM 55-1520-238-23.

NO: REPAIR OPEN WIRE BETWEEN:
P672-95 AND J578-1
P672-109 AND J578-2
P672-98 AND J578-3
P672-94 AND J578-3
GO TO PARA 6-9-1

NO: CHECK FOR SHORT BETWEEN GROUND AND:
P673-94, -95, -98, AND -109
DOES SHORT EXIST?

NO: REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, LH FAB

YES: DISCONNECT J579. CHECK FOR SHORT BETWEEN GROUND AND:
P578-1, -2, AND -3.
DOES SHORT EXIST?

YES: REPLACE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER
TM 55-1520-238-23.

NO: REPAIR SHORTED WIRE BETWEEN:
P672-94 AND J578-3
P672-95 AND J578-1
P672-98 AND J578-3
P672-109 AND J578-2
GO TO PARA 6-4-1

OIL PSI MAIN XMSN 2 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2

PILOT CAUTION/WARNING PANEL

MM04/1-1121A

END OF TASK

6-4-13. OIL PSI MAIN XMSN 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS LOW XMN2 OIL PRESSURE

Personnel Required:

67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

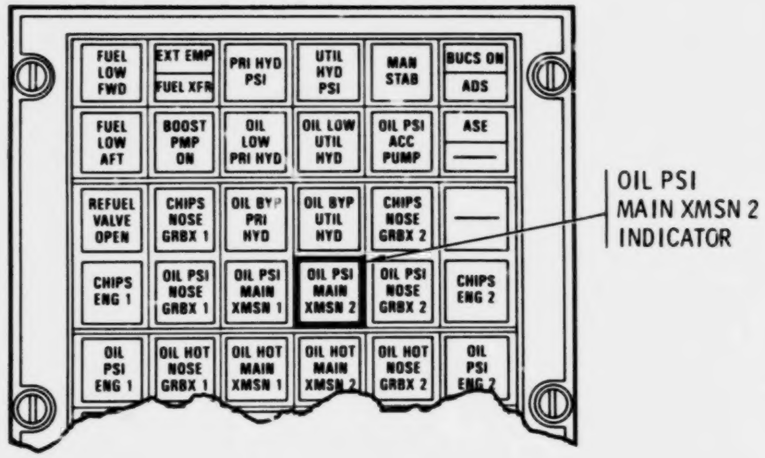
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter in hover

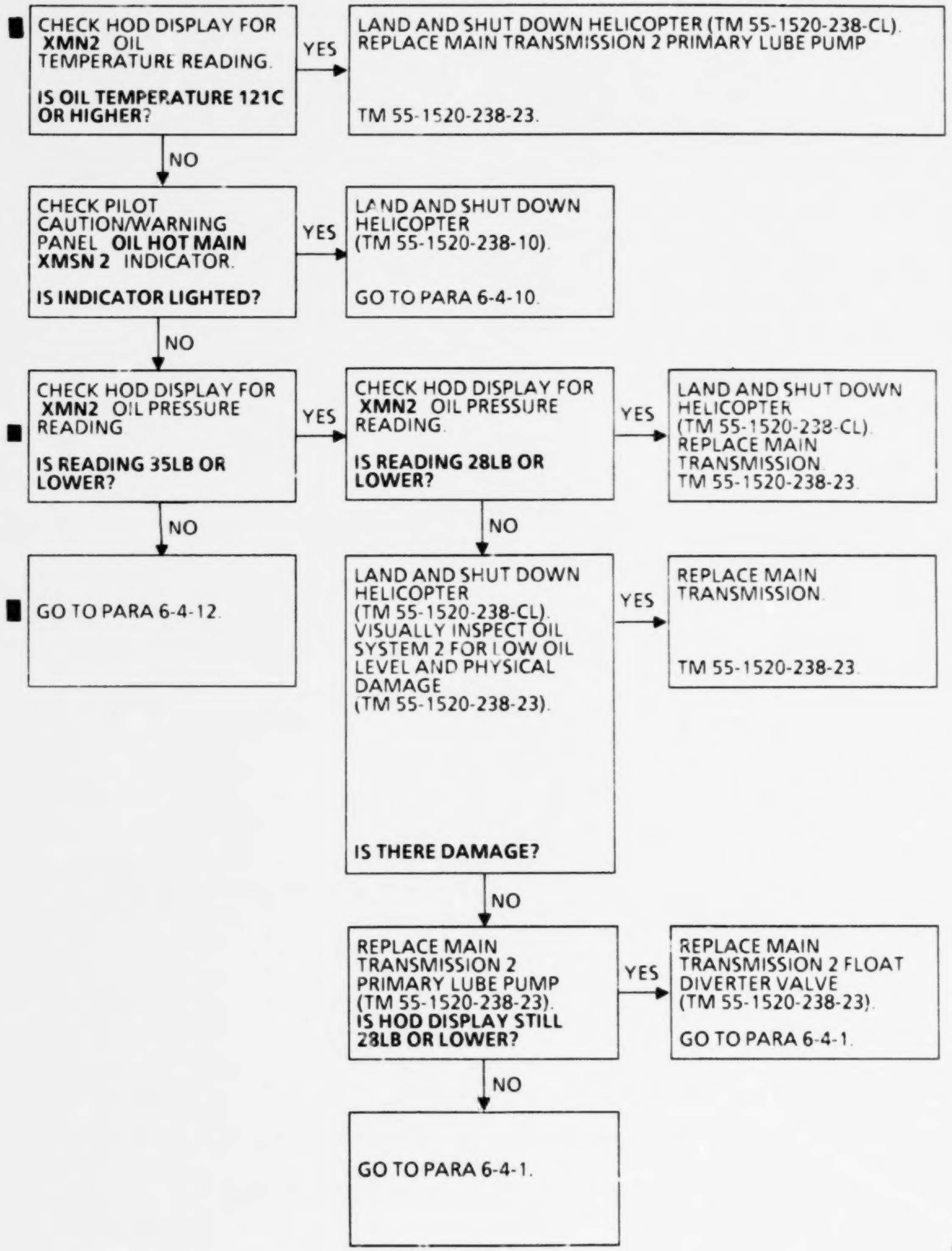
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL PSI MAIN XMSN 2 INDICATOR

PILOT CAUTION/WARNING PANEL

MM04-/1-1122A


CHECK HOD DISPLAY FOR XMN2 OIL TEMPERATURE READING. IS OIL TEMPERATURE 121C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). REPLACE MAIN TRANSMISSION 2 PRIMARY LUBE PUMP TM 55-1520-238-23.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL HOT MAIN XMSN 2 INDICATOR. IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). GO TO PARA 6-4-10.
NO
CHECK HOD DISPLAY FOR XMN2 OIL PRESSURE READING IS READING 35LB OR LOWER?
YES
CHECK HOD DISPLAY FOR XMN2 OIL PRESSURE READING. IS READING 28LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.
NO
GO TO PARA 6-4-12.
NO
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). VISUALLY INSPECT OIL SYSTEM 2 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
YES
REPLACE MAIN TRANSMISSION TM 55-1520-238-23.
NO
REPLACE MAIN TRANSMISSION 2 PRIMARY LUBE PUMP (TM 55-1520-238-23). IS HOD DISPLAY STILL 28LB OR LOWER?
YES
REPLACE MAIN TRANSMISSION 2 FLOAT DIVERTER VALVE (TM 55-1520-238-23). GO TO PARA 6-4-1.
NO
GO TO PARA 6-4-1.

END OF TASK

6-4-14. HOD NGB2 READING - DISPLAYS 28LB OR LESS OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

68F10 Aircraft Electrician
67R10 Attack Helicopter Repairer
100KG Pilot

References:

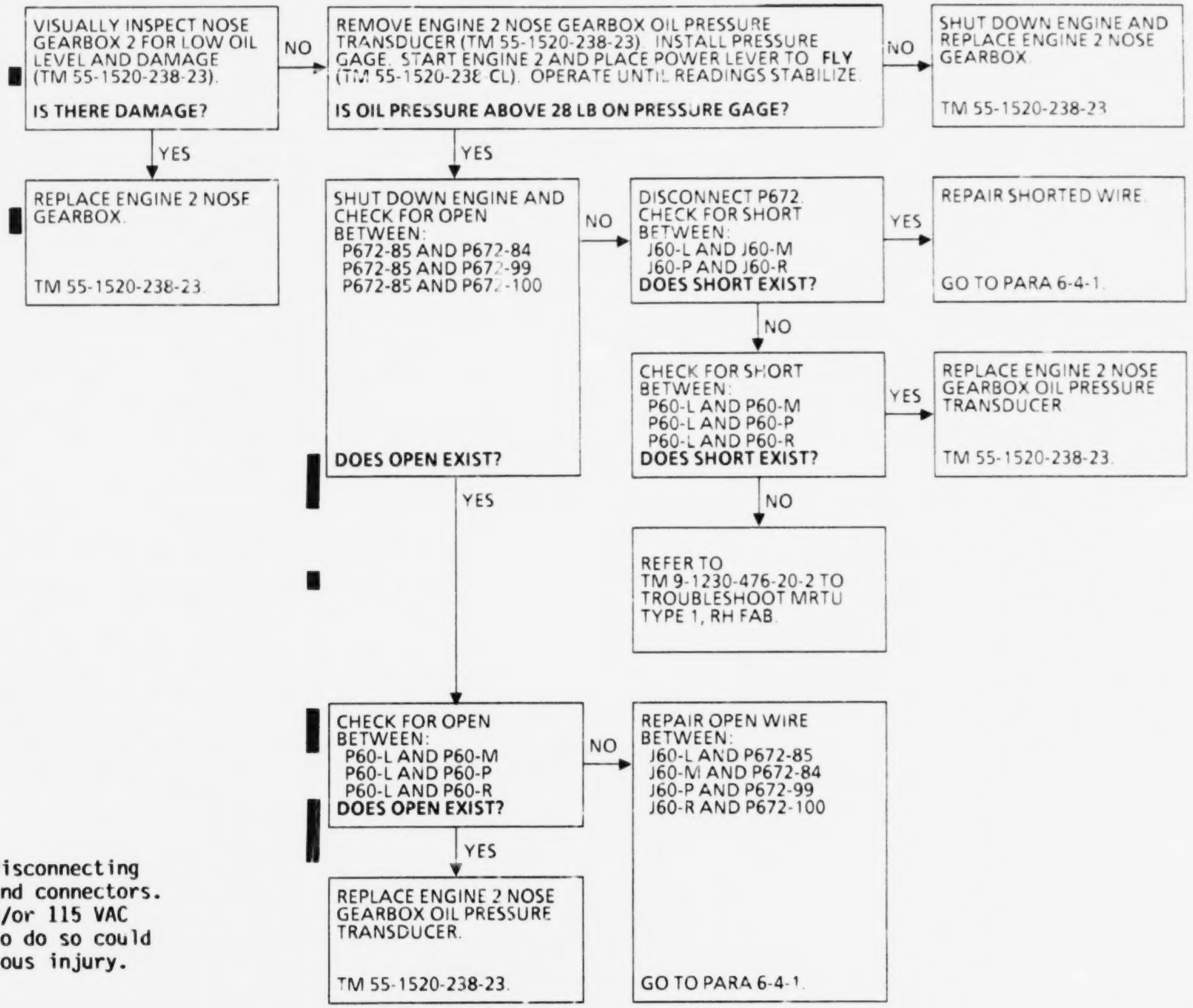
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R200 door open

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



VISUALLY INSPECT NOSE GEARBOX 2 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).
IS THERE DAMAGE?

REPLACE ENGINE 2 NOSE GEARBOX.
TM 55-1520-238-23.

REMOVE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 2 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238 CL). OPERATE UNTIL READINGS STABILIZE.
IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?

SHUT DOWN ENGINE AND REPLACE ENGINE 2 NOSE GEARBOX.
TM 55-1520-238-23

SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P672-85 AND P672-84
P672-85 AND P672-99
P672-85 AND P672-100
DOES OPEN EXIST?

DISCONNECT P672. CHECK FOR SHORT BETWEEN:
J60-L AND J60-M
J60-P AND J60-R
DOES SHORT EXIST?

REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.

CHECK FOR SHORT BETWEEN:
P60-L AND P60-M
P60-L AND P60-P
P60-L AND P60-R
DOES SHORT EXIST?

REPLACE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE 1, RH FAB.

CHECK FOR OPEN BETWEEN:
P60-L AND P60-M
P60-L AND P60-P
P60-L AND P60-R
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
J60-L AND P672-85
J60-M AND P672-84
J60-P AND P672-99
J60-R AND P672-100
GO TO PARA 6-4-1.

REPLACE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.

END OF TASK

6-4-15. HOD NGB2 READING - DISPLAYS LOW OIL PRESSURE

Personnel Required:

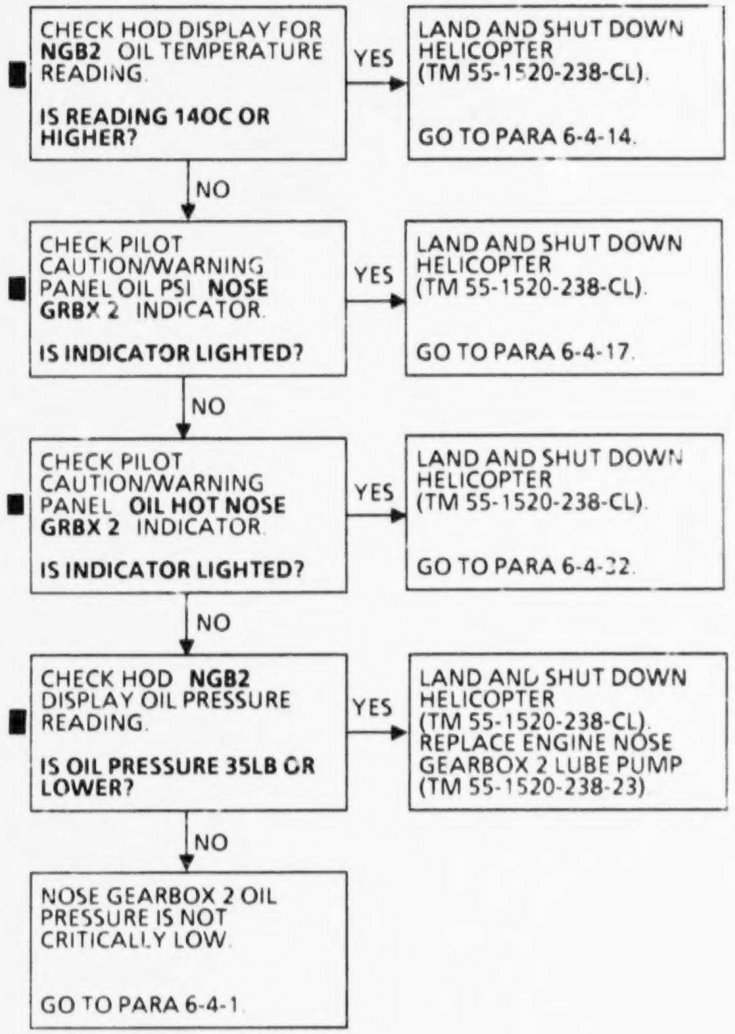
67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter in hover


CHECK HOD DISPLAY FOR **NGB2** OIL TEMPERATURE READING. **IS READING 140C OR HIGHER?**
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-14.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL PSI **NOSE GRBX 2** INDICATOR. **IS INDICATOR LIGHTED?**
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-17.
NO
CHECK PILOT CAUTION/WARNING PANEL **OIL HOT NOSE GRBX 2** INDICATOR. **IS INDICATOR LIGHTED?**
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-22.
NO
CHECK HOD **NGB2** DISPLAY OIL PRESSURE READING. **IS OIL PRESSURE 35LB OR LOWER?**
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). REPLACE ENGINE NOSE GEARBOX 2 LUBE PUMP (TM 55-1520-238-23).
NO
NOSE GEARBOX 2 OIL PRESSURE IS NOT CRITICALLY LOW. GO TO PARA 6-4-1.

END OF TASK

6-4-16. OIL PSI NOSE GRBX 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL NGB2 READING

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician
100KG Pilot

References:

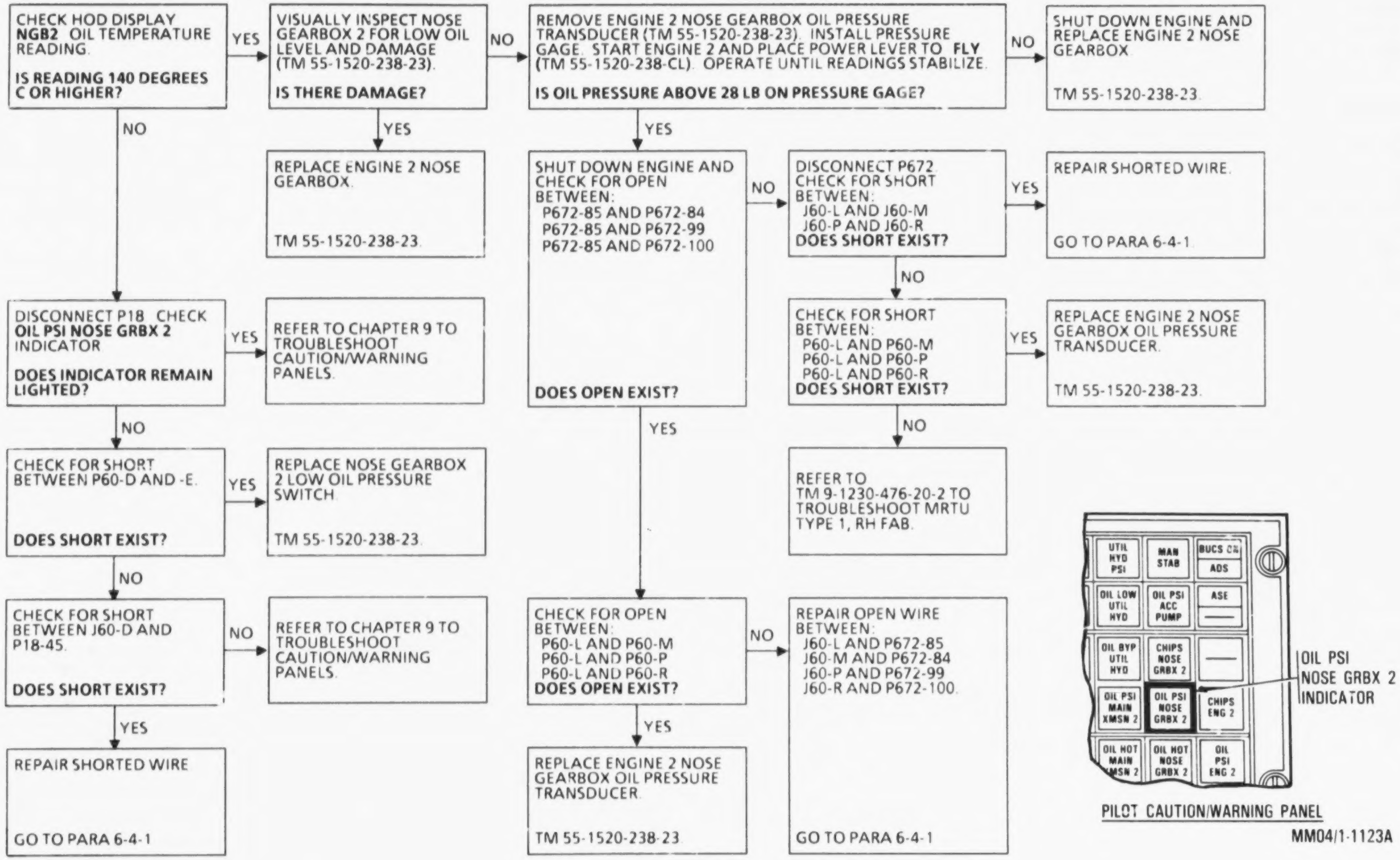
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK HOD DISPLAY NGB2 OIL TEMPERATURE READING.
IS READING 140 DEGREES C OR HIGHER?
YES
NO
VISUALLY INSPECT NOSE GEARBOX 2 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).
IS THERE DAMAGE?
NO
YES
REMOVE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 2 AND PLACE POWER LEVER TO FLY (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE.
IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?
NO
YES
SHUT DOWN ENGINE AND REPLACE ENGINE 2 NOSE GEARBOX.
TM 55-1520-238-23.
REPLACE ENGINE 2 NOSE GEARBOX.
TM 55-1520-238-23.
SHUT DOWN ENGINE AND CHECK FOR OPEN BETWEEN:
P672-85 AND P672-84
P672-85 AND P672-99
P672-85 AND P672-100
DOES OPEN EXIST?
NO
DISCONNECT P672. CHECK FOR SHORT BETWEEN:
J60-L AND J60-M
J60-P AND J60-R
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.
NO
CHECK FOR SHORT BETWEEN:
P60-L AND P60-M
P60-L AND P60-P
P60-L AND P60-R
DOES SHORT EXIST?
YES
REPLACE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.
NO
REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE 1, RH FAB.
DISCONNECT P18. CHECK OIL PSI NOSE GRBX 2 INDICATOR.
DOES INDICATOR REMAIN LIGHTED?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
NO
CHECK FOR SHORT BETWEEN P60-D AND -E.
DOES SHORT EXIST?
YES
REPLACE NOSE GEARBOX 2 LOW OIL PRESSURE SWITCH.
TM 55-1520-238-23.
NO
CHECK FOR SHORT BETWEEN J60-D AND P18-45.
DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.
YES
CHECK FOR OPEN BETWEEN:
P60-L AND P60-M
P60-L AND P60-P
P60-L AND P60-R
DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN:
J60-L AND P672-85
J60-M AND P672-84
J60-P AND P672-99
J60-R AND P672-100.
GO TO PARA 6-4-1.
YES
REPLACE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER.
TM 55-1520-238-23.

UTIL HYD PSI
MAN STAB
BUCS ON
ADS
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL PSI NOSE GRBX 2 INDICATOR

PILOT CAUTION/WARNING PANEL

MM04/1-1123A

END OF TASK

6-4-17. OIL PSI NOSE GRBX 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS LOW NGB2 OIL PRESSURE

Personnel Required:

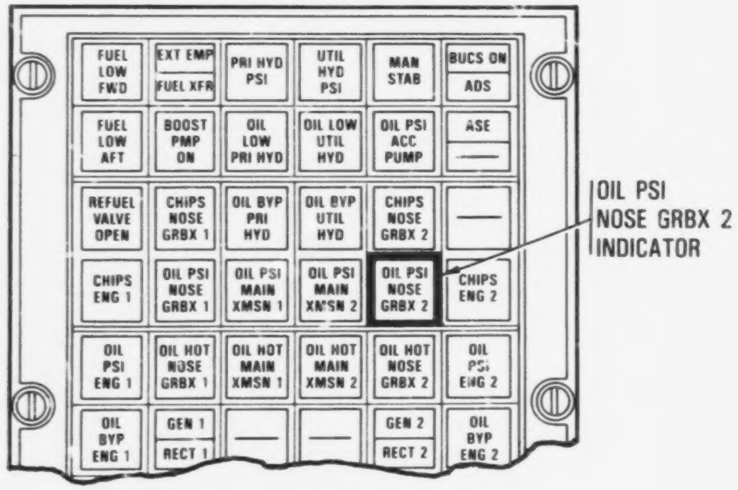
68D10	Aircraft Powertrain Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-10
TM 55-1520-238-23

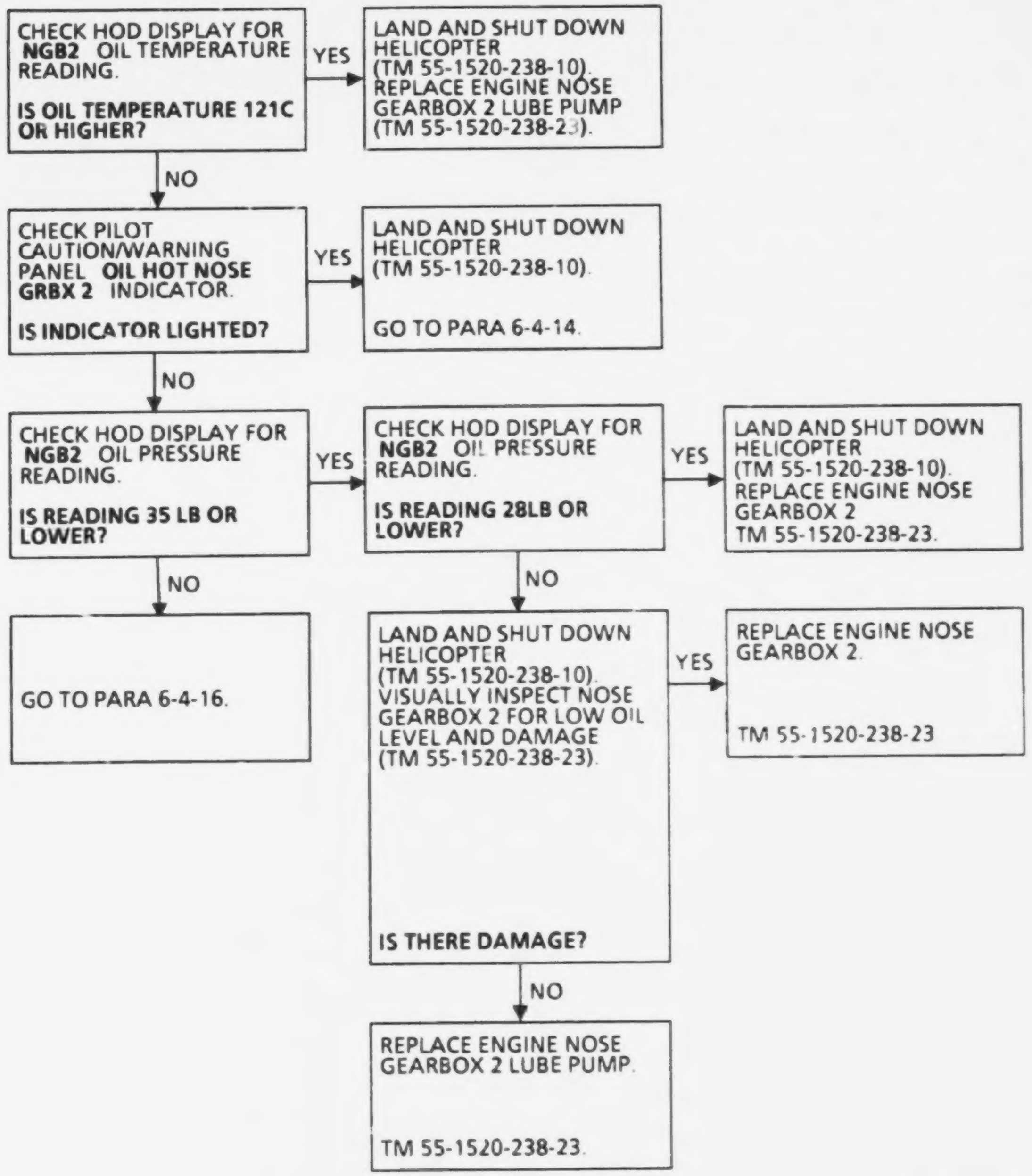
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-10	Helicopter in hover


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
OIL PSI NOSE GRBX 2 INDICATOR

PILOT CAUTION/WARNING PANEL

MM04/1-1124A


CHECK HOD DISPLAY FOR **NGB2** OIL TEMPERATURE READING.
IS OIL TEMPERATURE 121C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE ENGINE NOSE GEARBOX 2 LUBE PUMP (TM 55-1520-238-23).
NO
CHECK PILOT CAUTION/WARNING PANEL **OIL HOT NOSE GRBX 2** INDICATOR.
IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10).
GO TO PARA 6-4-14.
NO
CHECK HOD DISPLAY FOR **NGB2** OIL PRESSURE READING.
IS READING 35 LB OR LOWER?
YES
CHECK HOD DISPLAY FOR **NGB2** OIL PRESSURE READING.
IS READING 28LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). REPLACE ENGINE NOSE GEARBOX 2 TM 55-1520-238-23.
NO
GO TO PARA 6-4-16.
NO
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). VISUALLY INSPECT NOSE GEARBOX 2 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).
IS THERE DAMAGE?
YES
REPLACE ENGINE NOSE GEARBOX 2.
TM 55-1520-238-23
NO
REPLACE ENGINE NOSE GEARBOX 2 LUBE PUMP.
TM 55-1520-238-23.

END OF TASK

6-4-18. HOD NGB1 READING - DISPLAYS 140 DEGREES C OR HIGHER OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

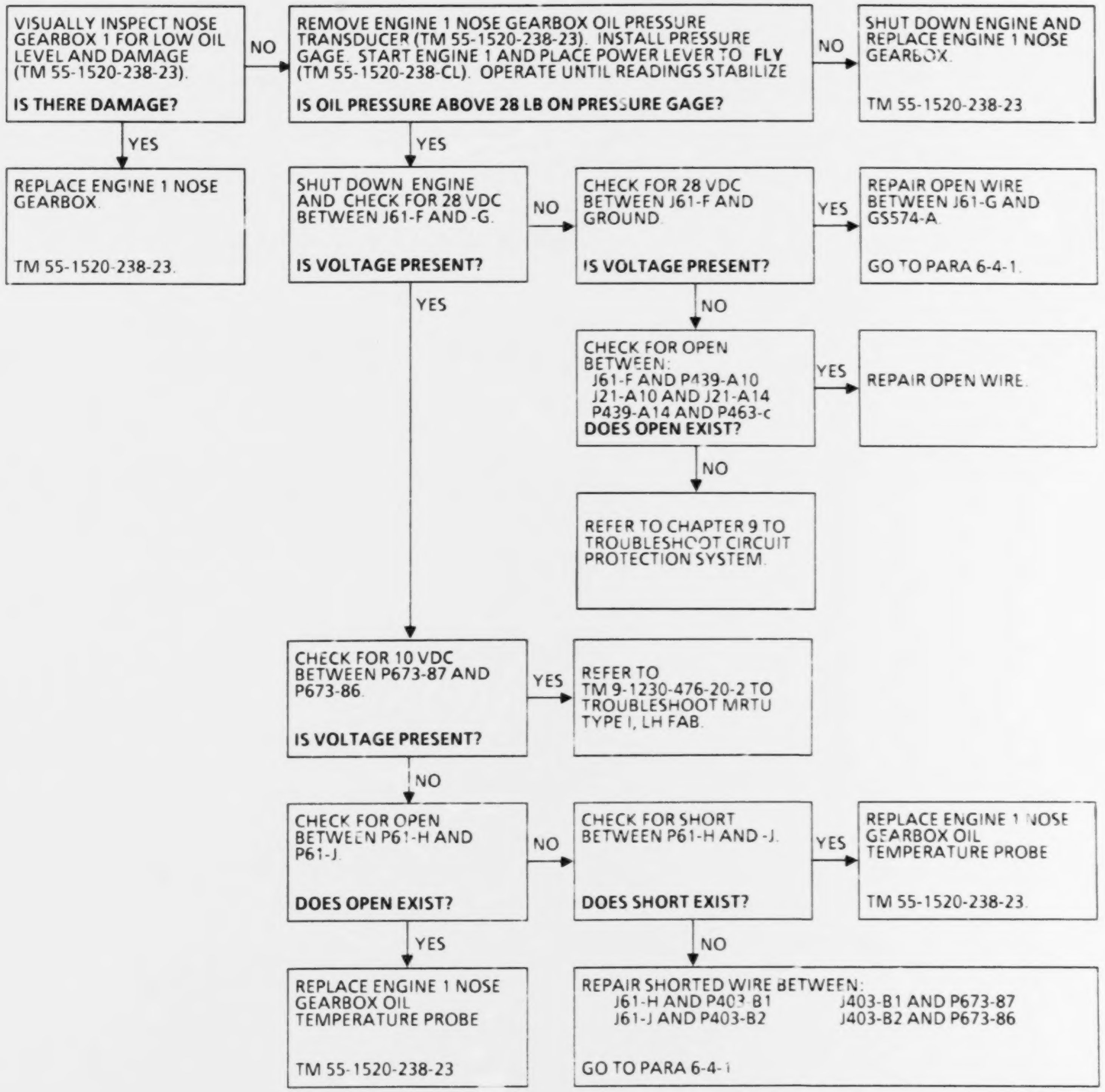
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed Access provisions - L200 door open

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



VISUALLY INSPECT NOSE GEARBOX 1 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).
IS THERE DAMAGE?

REPLACE ENGINE 1 NOSE GEARBOX.
TM 55-1520-238-23.

REMOVE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE
IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?

SHUT DOWN ENGINE AND REPLACE ENGINE 1 NOSE GEARBOX.
TM 55-1520-238-23

SHUT DOWN ENGINE AND CHECK FOR 28 VDC BETWEEN J61-F AND -G.
IS VOLTAGE PRESENT?

CHECK FOR 28 VDC BETWEEN J61-F AND GROUND.
IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN J61-G AND GS574-A.
GO TO PARA 6-4-1.

CHECK FOR OPEN BETWEEN:
J61-F AND P439-A10
J21-A10 AND J21-A14
P439-A14 AND P463-c
DOES OPEN EXIST?

REPAIR OPEN WIRE.

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

CHECK FOR 10 VDC BETWEEN P673-87 AND P673-86.
IS VOLTAGE PRESENT?

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, LH FAB.

CHECK FOR OPEN BETWEEN P61-H AND P61-J.
DOES OPEN EXIST?

REPLACE ENGINE 1 NOSE GEARBOX OIL TEMPERATURE PROBE
TM 55-1520-238-23

CHECK FOR SHORT BETWEEN P61-H AND -J.
DOES SHORT EXIST?

REPLACE ENGINE 1 NOSE GEARBOX OIL TEMPERATURE PROBE
TM 55-1520-238-23.

REPAIR SHORTED WIRE BETWEEN:
J61-H AND P403-B1 J403-B1 AND P673-87
J61-J AND P403-B2 J403-B2 AND P673-86
GO TO PARA 6-4-1

END OF TASK

6-4-19. HOD NGB1 READING - DISPLAYS HIGH OIL TEMPERATURE

Personnel Required:

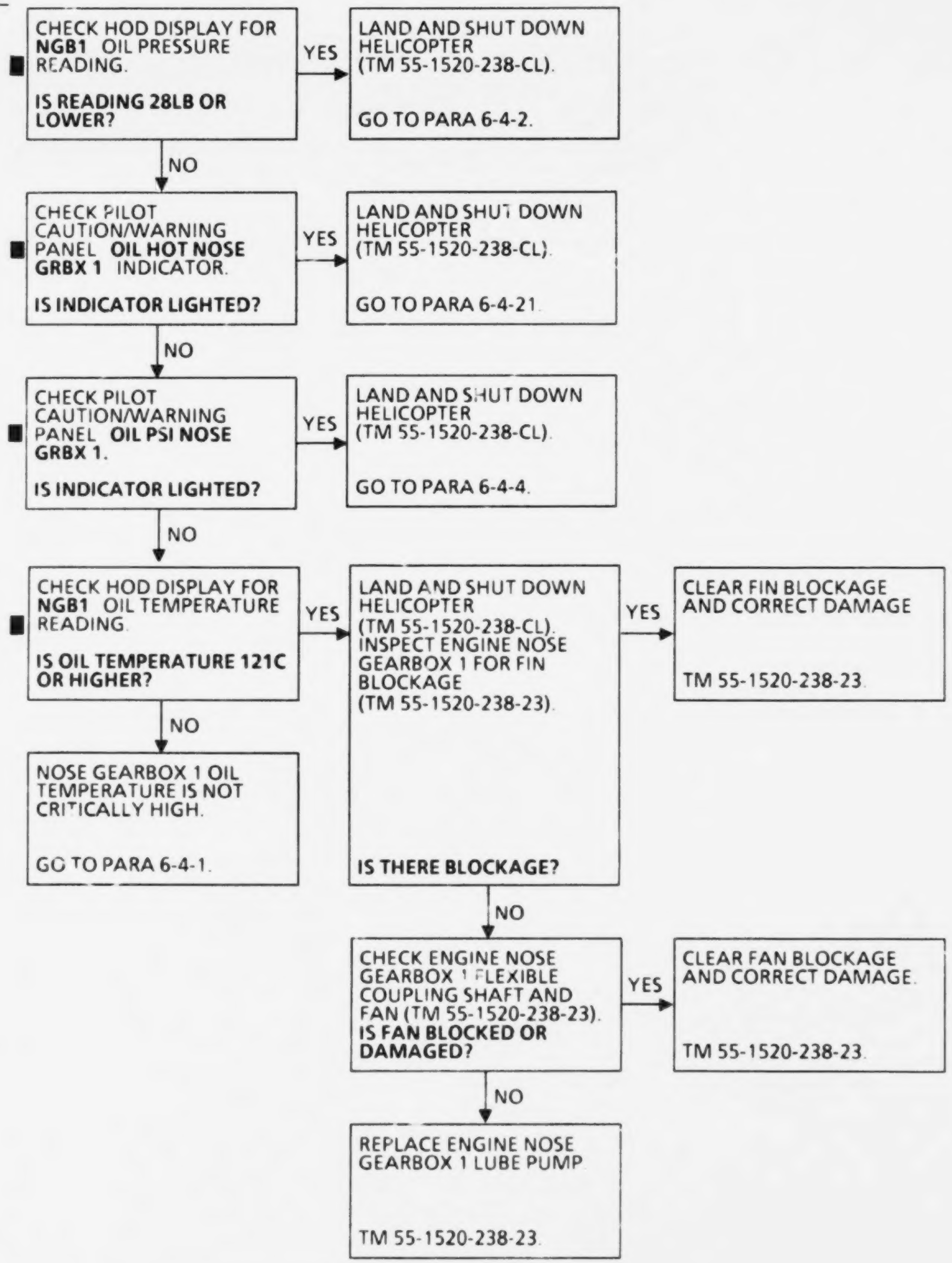
67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter in hover



CHECK HOD DISPLAY FOR **NGB1** OIL PRESSURE READING.
IS READING 28LB OR LOWER?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-2.

NO: CHECK PILOT CAUTION/WARNING PANEL **OIL HOT NOSE GRBX 1** INDICATOR.
IS INDICATOR LIGHTED?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-21.

NO: CHECK PILOT CAUTION/WARNING PANEL **OIL PSI NOSE GRBX 1.**
IS INDICATOR LIGHTED?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-4.

NO: CHECK HOD DISPLAY FOR **NGB1** OIL TEMPERATURE READING.
IS OIL TEMPERATURE 121C OR HIGHER?

NO: NOSE GEARBOX 1 OIL TEMPERATURE IS NOT CRITICALLY HIGH. GO TO PARA 6-4-1.

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). INSPECT ENGINE NOSE GEARBOX 1 FOR FIN BLOCKAGE (TM 55-1520-238-23).
IS THERE BLOCKAGE?

YES: CLEAR FIN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23.

NO: CHECK ENGINE NOSE GEARBOX 1 FLEXIBLE COUPLING SHAFT AND FAN (TM 55-1520-238-23).
IS FAN BLOCKED OR DAMAGED?

YES: CLEAR FAN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23.

NO: REPLACE ENGINE NOSE GEARBOX 1 LUBE PUMP. TM 55-1520-238-23.

END OF TASK

6-4-20. OIL HOT NOSE GRBX 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL NGB1 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

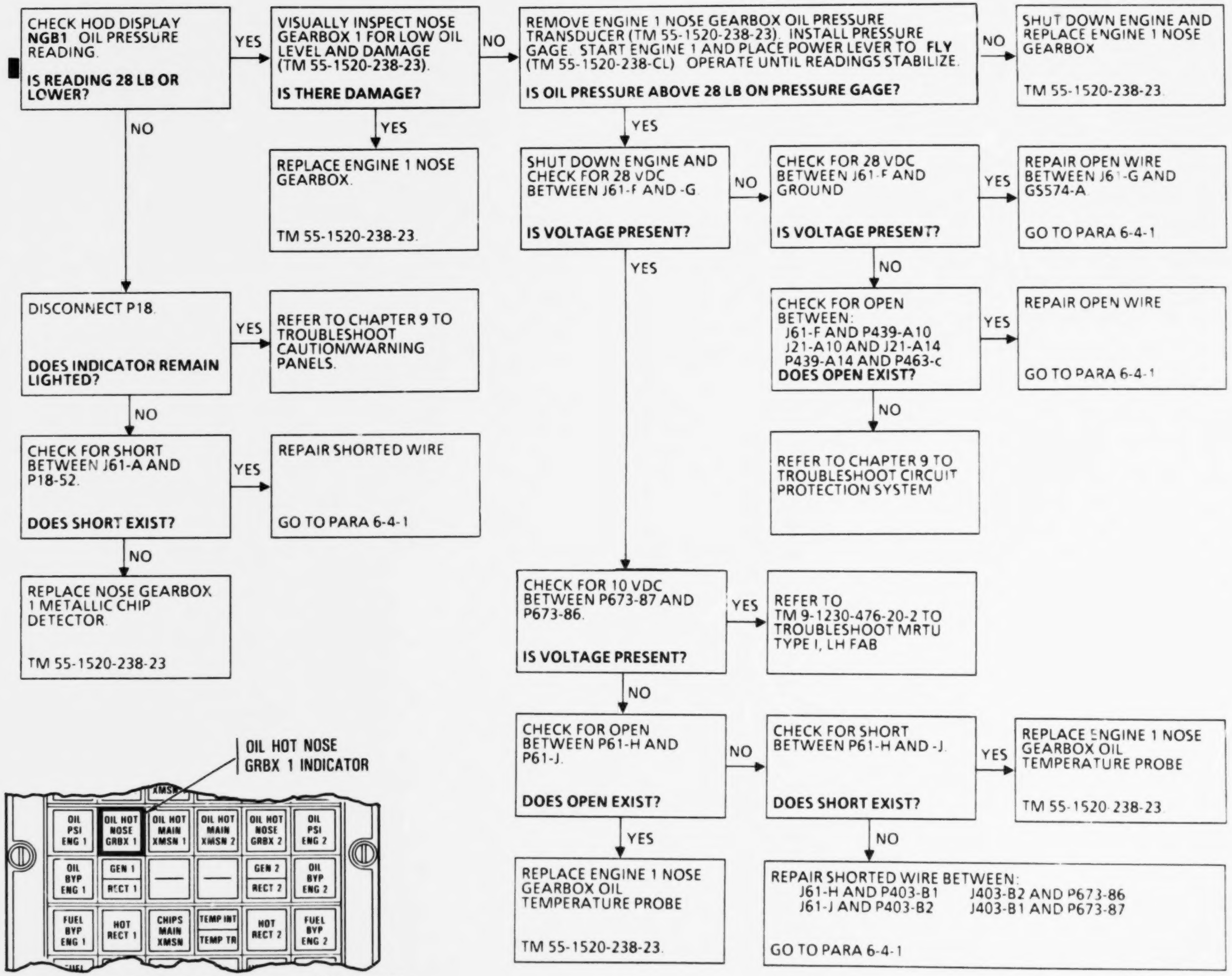
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK HOD DISPLAY NGB1 OIL PRESSURE READING. IS READING 28 LB OR LOWER?
YES
VISUALLY INSPECT NOSE GEARBOX 1 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
NO
REMOVE ENGINE 1 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO FLY (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE. IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?
NO
SHUT DOWN ENGINE AND REPLACE ENGINE 1 NOSE GEARBOX TM 55-1520-238-23.
YES
REPLACE ENGINE 1 NOSE GEARBOX. TM 55-1520-238-23.
YES
SHUT DOWN ENGINE AND CHECK FOR 28 VDC BETWEEN J61-F AND -G. IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN J61-F AND GROUND. IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN J61-G AND GS574-A. GO TO PARA 6-4-1
NO
CHECK FOR OPEN BETWEEN: J61-F AND P439-A10 J21-A10 AND J21-A14 P439-A14 AND P463-c DOES OPEN EXIST?
YES
REPAIR OPEN WIRE GO TO PARA 6-4-1
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM
NO
DISCONNECT P18. DOES INDICATOR REMAIN LIGHTED?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
NO
CHECK FOR SHORT BETWEEN J61-A AND P18-52. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE GO TO PARA 6-4-1
NO
REPLACE NOSE GEARBOX 1 METALLIC CHIP DETECTOR. TM 55-1520-238-23
YES
CHECK FOR 10 VDC BETWEEN P673-87 AND P673-86. IS VOLTAGE PRESENT?
YES
REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, LH FAB
NO
CHECK FOR OPEN BETWEEN P61-H AND P61-J. DOES OPEN EXIST?
NO
CHECK FOR SHORT BETWEEN P61-H AND -J. DOES SHORT EXIST?
YES
REPLACE ENGINE 1 NOSE GEARBOX OIL TEMPERATURE PROBE TM 55-1520-238-23
YES
REPLACE ENGINE 1 NOSE GEARBOX OIL TEMPERATURE PROBE TM 55-1520-238-23.
NO
REPAIR SHORTED WIRE BETWEEN: J61-H AND P403-B1 J61-J AND P403-B2 J403-B2 AND P673-86 J403-B1 AND P673-87 GO TO PARA 6-4-1

OIL HOT NOSE GRBX 1 INDICATOR
XMSN
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2

PILOT CAUTION/WARNING PANEL

MM04/1-1125

END OF TASK

6-4-21. OIL HOT NOSE GRBX 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS HIGH NGB1 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic	5180-00-323-4696
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

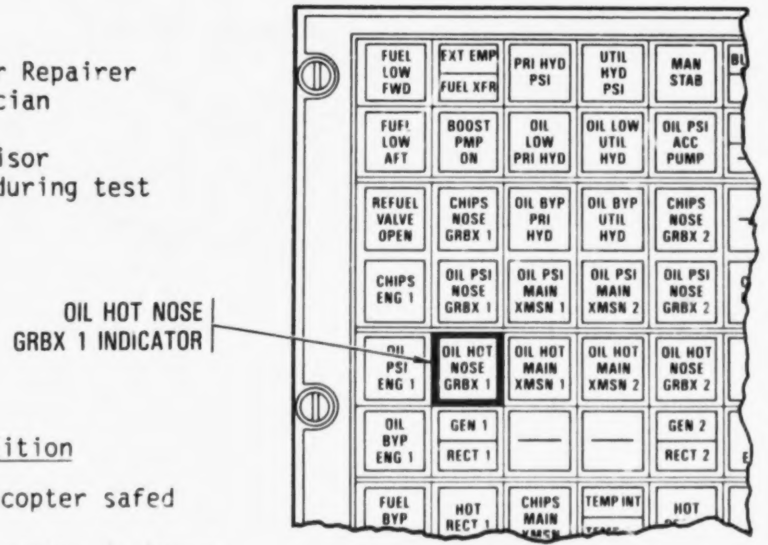
67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-CL	Helicopter in hover

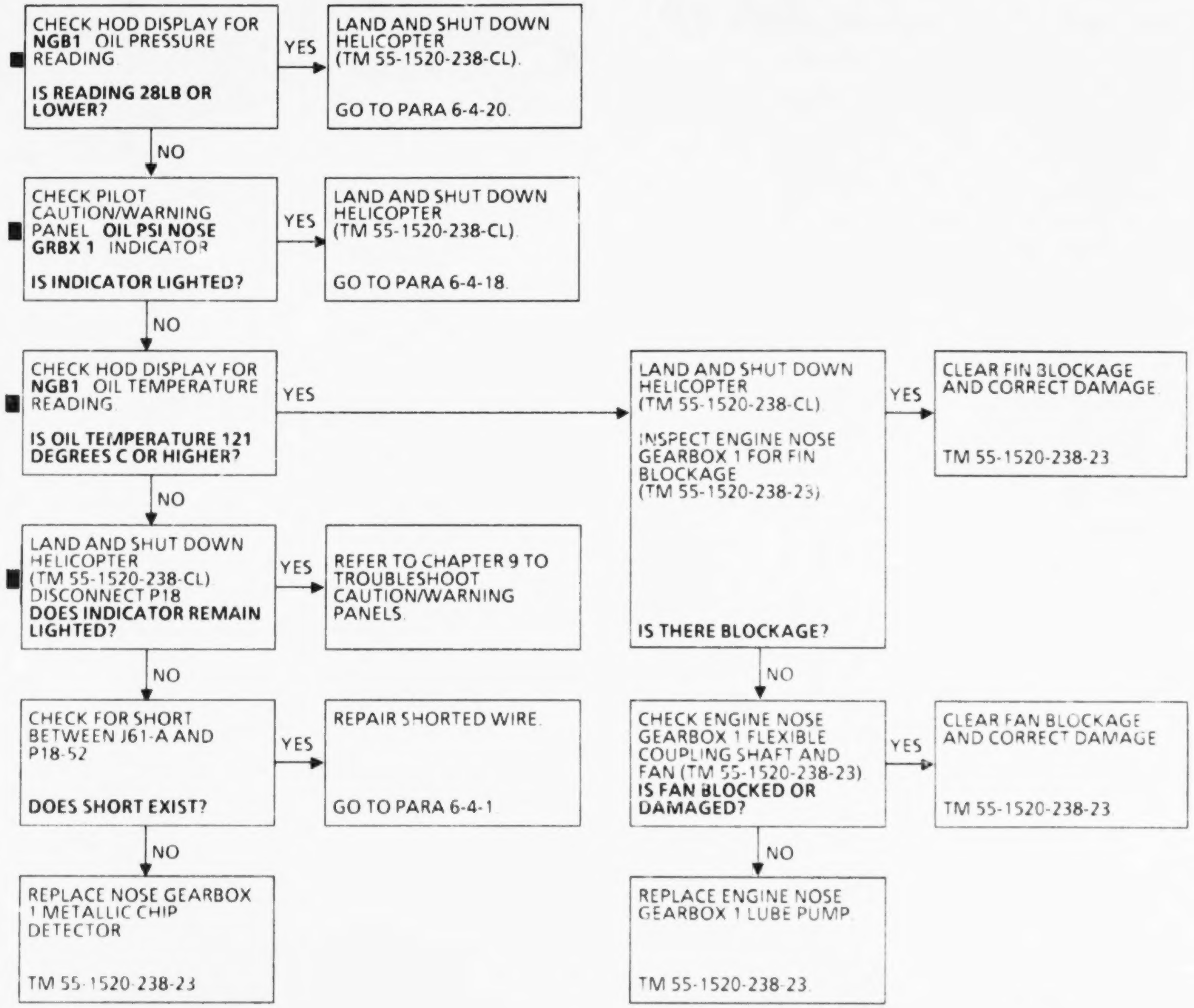

OIL HOT NOSE GRBX 1 INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
FUEL BYP
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
HOT

PILOT CAUTION/WARNING PANEL

MM04/1-1126

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK HOD DISPLAY FOR **NGB1** OIL PRESSURE READING.
IS READING 28LB OR LOWER?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-20.

NO: CHECK PILOT CAUTION/WARNING PANEL **OIL PSI NOSE GRBX 1** INDICATOR.
IS INDICATOR LIGHTED?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-18.

NO: CHECK HOD DISPLAY FOR **NGB1** OIL TEMPERATURE READING.
IS OIL TEMPERATURE 121 DEGREES C OR HIGHER?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). INSPECT ENGINE NOSE GEARBOX 1 FOR FIN BLOCKAGE (TM 55-1520-238-23).
IS THERE BLOCKAGE?

YES: CLEAR FIN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23

NO: CHECK ENGINE NOSE GEARBOX 1 FLEXIBLE COUPLING SHAFT AND FAN (TM 55-1520-238-23)
IS FAN BLOCKED OR DAMAGED?

YES: CLEAR FAN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23

NO: REPLACE ENGINE NOSE GEARBOX 1 LUBE PUMP. TM 55-1520-238-23.

NO: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL) DISCONNECT P18.
DOES INDICATOR REMAIN LIGHTED?

YES: REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

NO: CHECK FOR SHORT BETWEEN J61-A AND P18-52.
DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 6-4-1

NO: REPLACE NOSE GEARBOX 1 METALLIC CHIP DETECTOR. TM 55-1520-238-23

END OF TASK

6-4-22. HOD XMN1 READING - DISPLAYS 140 DEGREES C OR HIGHER OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

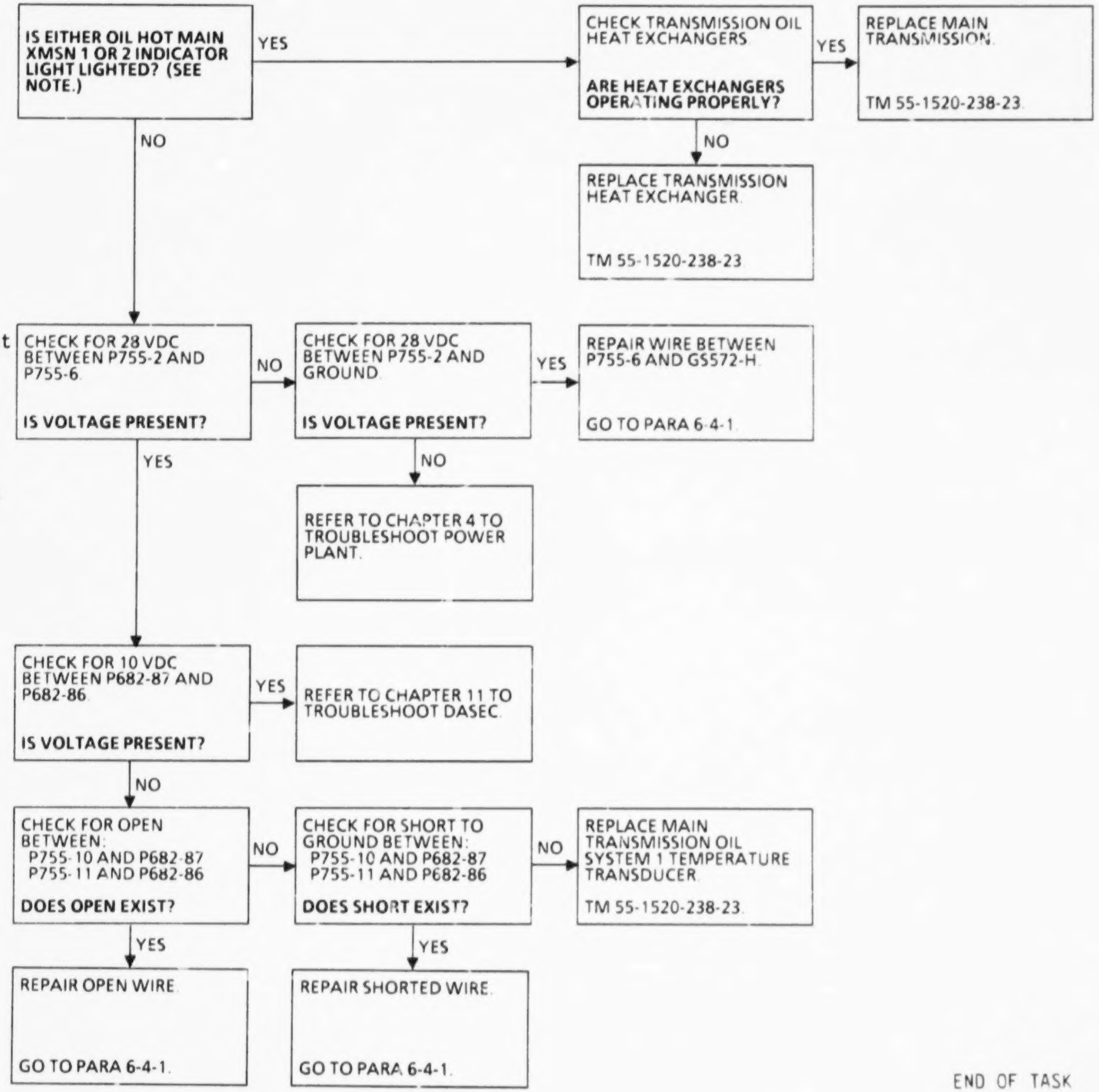
Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

NOTE

If HOD is indicating 140°C or higher for main transmission oil temperature, either **OIL HOT MAIN XMSN** indicator light may be lighted or both, depending upon temperature difference readings at temperature transducers. Transmission temperature transducer No. 2 may be considerably cooler than No. 1 due to hot oil being pumped into transmission No. 1 sump first. Therefore, if **XMSN 1 OIL HOT** light is on and No. 2 off, the No. 2 circuitry may not necessarily require troubleshooting.


IS EITHER OIL HOT MAIN XMSN 1 OR 2 INDICATOR LIGHT LIGHTED? (SEE NOTE.)
YES
CHECK TRANSMISSION OIL HEAT EXCHANGERS.
ARE HEAT EXCHANGERS OPERATING PROPERLY?
YES
REPLACE MAIN TRANSMISSION.
TM 55-1520-238-23.
NO
REPLACE TRANSMISSION HEAT EXCHANGER.
TM 55-1520-238-23.
NO
CHECK FOR 28 VDC BETWEEN P755-2 AND P755-6.
IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN P755-2 AND GROUND.
IS VOLTAGE PRESENT?
YES
REPAIR WIRE BETWEEN P755-6 AND GS572-H.
GO TO PARA 6-4-1.
NO
REFER TO CHAPTER 4 TO TROUBLESHOOT POWER PLANT.
YES
CHECK FOR 10 VDC BETWEEN P682-87 AND P682-86.
IS VOLTAGE PRESENT?
YES
REFER TO CHAPTER 11 TO TROUBLESHOOT DASEC.
NO
CHECK FOR OPEN BETWEEN:
P755-10 AND P682-87
P755-11 AND P682-86
DOES OPEN EXIST?
NO
CHECK FOR SHORT TO GROUND BETWEEN:
P755-10 AND P682-87
P755-11 AND P682-86
DOES SHORT EXIST?
NO
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 TEMPERATURE TRANSDUCER.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 6-4-1.
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.

END OF TASK

6-4-23. HOD XMN1 READING - DISPLAYS HIGH OIL TEMPERATURE

Personnel Required:

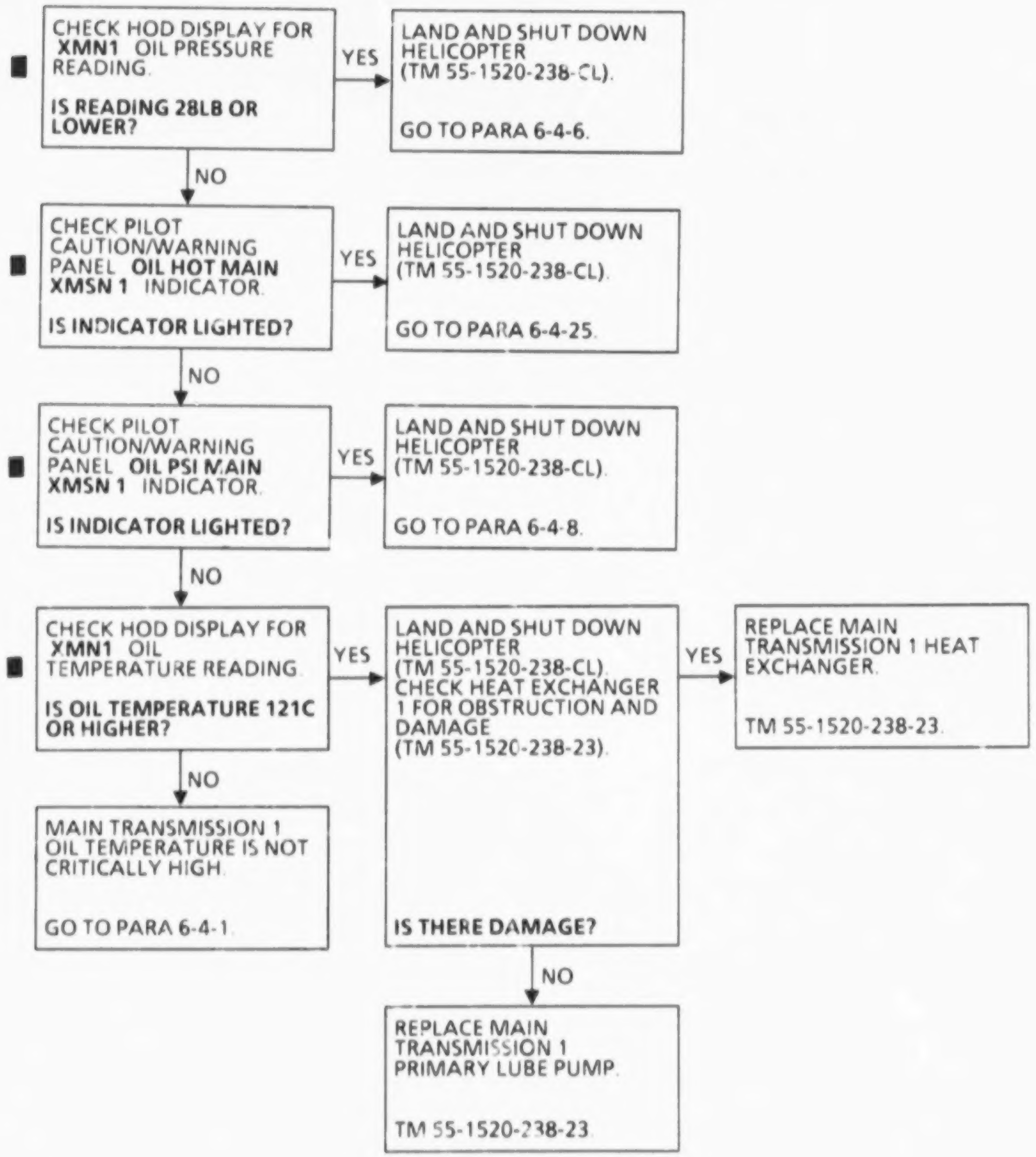
67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter in hover



CHECK HOD DISPLAY FOR **XMN1** OIL PRESSURE READING. **IS READING 28LB OR LOWER?**

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-6.

CHECK PILOT CAUTION/WARNING PANEL **OIL HOT MAIN XMSN 1** INDICATOR. **IS INDICATOR LIGHTED?**

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-25.

CHECK PILOT CAUTION/WARNING PANEL **OIL PSI MAIN XMSN 1** INDICATOR. **IS INDICATOR LIGHTED?**

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-8.

CHECK HOD DISPLAY FOR **XMN1** OIL TEMPERATURE READING. **IS OIL TEMPERATURE 121C OR HIGHER?**

LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). CHECK HEAT EXCHANGER 1 FOR OBSTRUCTION AND DAMAGE (TM 55-1520-238-23). **IS THERE DAMAGE?**

REPLACE MAIN TRANSMISSION 1 HEAT EXCHANGER. TM 55-1520-238-23.

REPLACE MAIN TRANSMISSION 1 PRIMARY LUBE PUMP. TM 55-1520-238-23.

MAIN TRANSMISSION 1 OIL TEMPERATURE IS NOT CRITICALLY HIGH. GO TO PARA 6-4-1.

END OF TASK

6-4-24. OIL HOT MAIN XMSN 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL XMN1 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician
100KG Pilot

References:

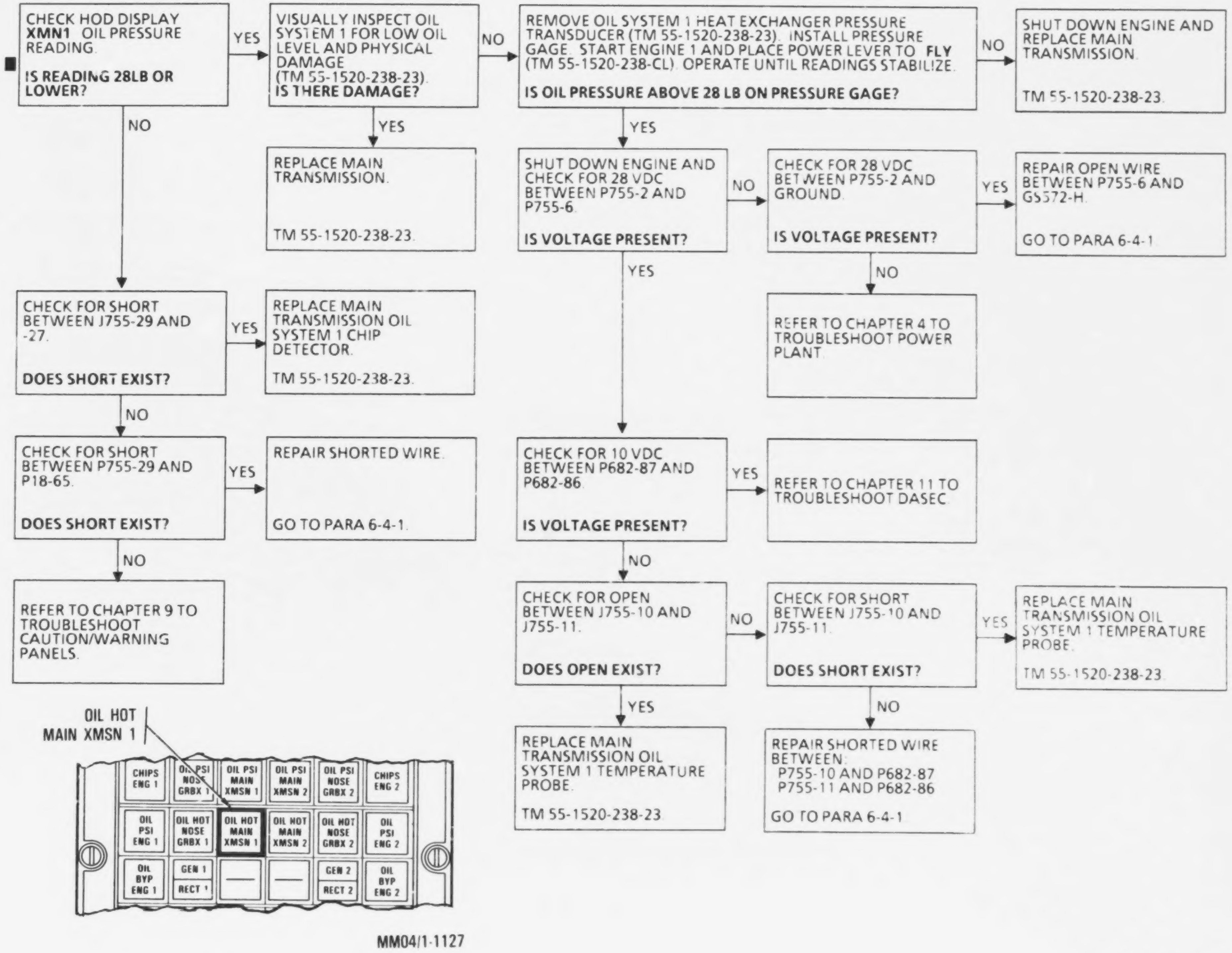
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK HOD DISPLAY XMN1 OIL PRESSURE READING. IS READING 28LB OR LOWER?
YES
VISUALLY INSPECT OIL SYSTEM 1 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
NO
REMOVE OIL SYSTEM 1 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 1 AND PLACE POWER LEVER TO FLY (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE. IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?
NO
SHUT DOWN ENGINE AND REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.
YES
REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.
YES
SHUT DOWN ENGINE AND CHECK FOR 28 VDC BETWEEN P755-2 AND P755-6. IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN P755-2 AND GROUND. IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN P755-6 AND GS572-H. GO TO PARA 6-4-1
NO
REFER TO CHAPTER 4 TO TROUBLESHOOT POWER PLANT.
NO
CHECK FOR SHORT BETWEEN J755-29 AND -27. DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 CHIP DETECTOR. TM 55-1520-238-23.
NO
CHECK FOR SHORT BETWEEN P755-29 AND P18-65. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE. GO TO PARA 6-4-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
CHECK FOR 10 VDC BETWEEN P682-87 AND P682-86. IS VOLTAGE PRESENT?
YES
REFER TO CHAPTER 11 TO TROUBLESHOOT DASEC.
NO
CHECK FOR OPEN BETWEEN J755-10 AND J755-11. DOES OPEN EXIST?
NO
CHECK FOR SHORT BETWEEN J755-10 AND J755-11. DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 TEMPERATURE PROBE. TM 55-1520-238-23
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 TEMPERATURE PROBE. TM 55-1520-238-23
NO
REPAIR SHORTED WIRE BETWEEN: P755-10 AND P682-87 P755-11 AND P682-86 GO TO PARA 6-4-1
OIL HOT MAIN XMSN 1
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1 RECT 1
GEN 2 RECT 2
OIL BYP ENG 2

MM04/1-1127

END OF TASK

6-4-25. OIL HOT MAIN XMSN 1 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS HIGH XMN1 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10	Aircraft Electrician
67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

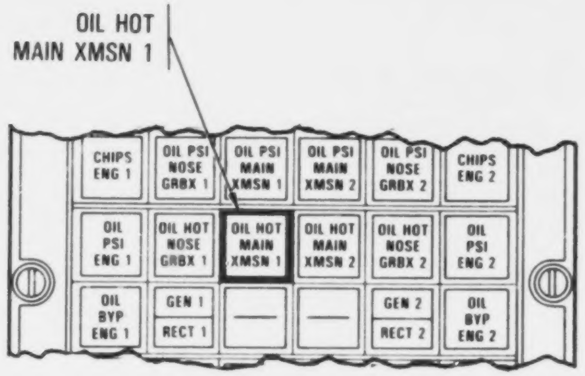
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter in hover

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OIL HOT MAIN XMSN 1
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1 RECT 1
GEN 2 RECT 2
OIL BYP ENG 2

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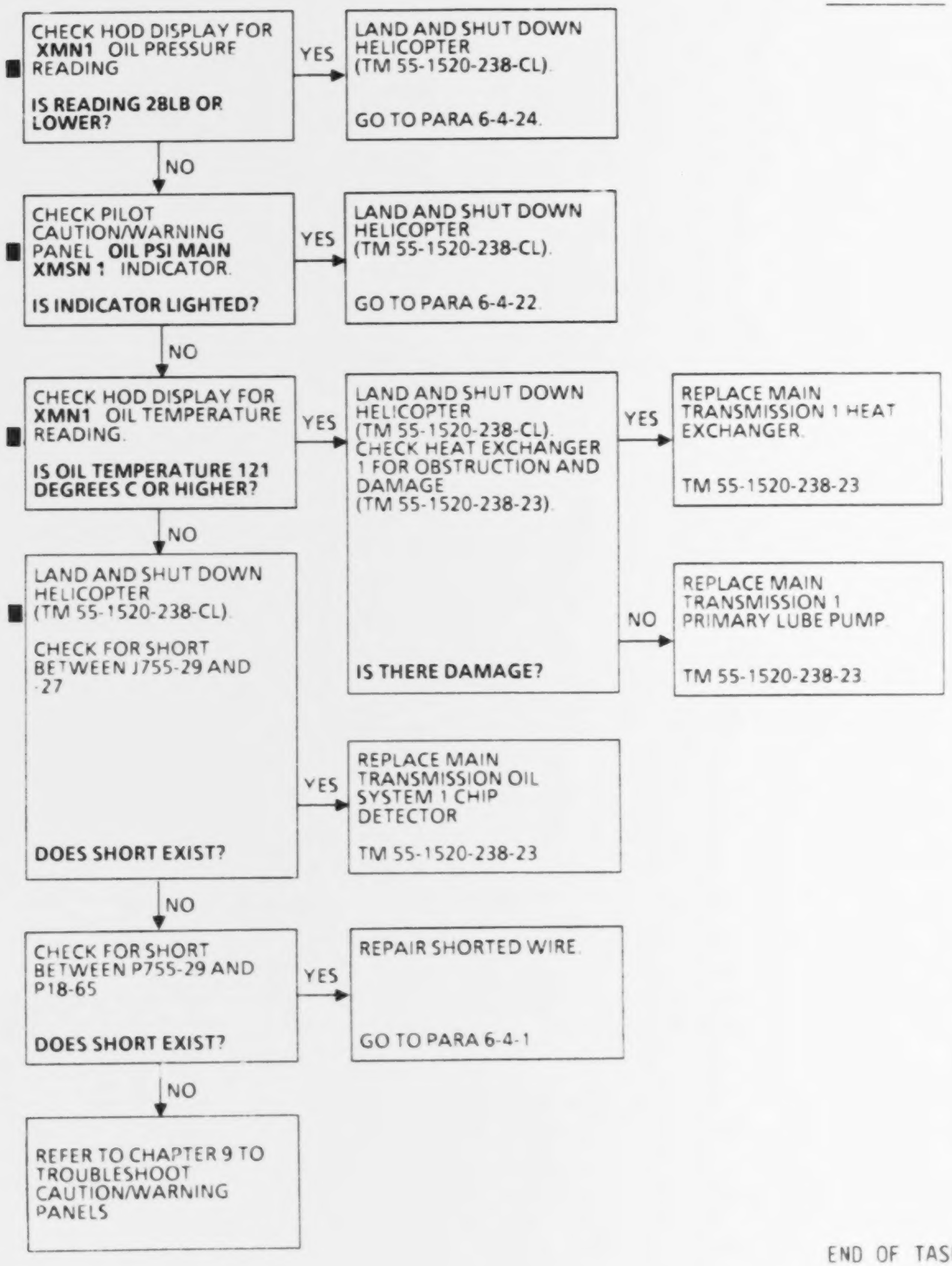

CHECK HOD DISPLAY FOR XMN1 OIL PRESSURE READING. IS READING 28LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-24.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL PSI MAIN XMSN 1 INDICATOR. IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-22.
NO
CHECK HOD DISPLAY FOR XMN1 OIL TEMPERATURE READING. IS OIL TEMPERATURE 121 DEGREES C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). CHECK HEAT EXCHANGER 1 FOR OBSTRUCTION AND DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
YES
REPLACE MAIN TRANSMISSION 1 HEAT EXCHANGER. TM 55-1520-238-23
NO
REPLACE MAIN TRANSMISSION 1 PRIMARY LUBE PUMP. TM 55-1520-238-23
NO
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). CHECK FOR SHORT BETWEEN J755-29 AND -27. DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 1 CHIP DETECTOR. TM 55-1520-238-23
NO
CHECK FOR SHORT BETWEEN P755-29 AND P18-65. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE. GO TO PARA 6-4-1
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS

END OF TASK

6-4-26. HOD XMN2 READING - DISPLAYS 140 DEGREES C OR HIGHER OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

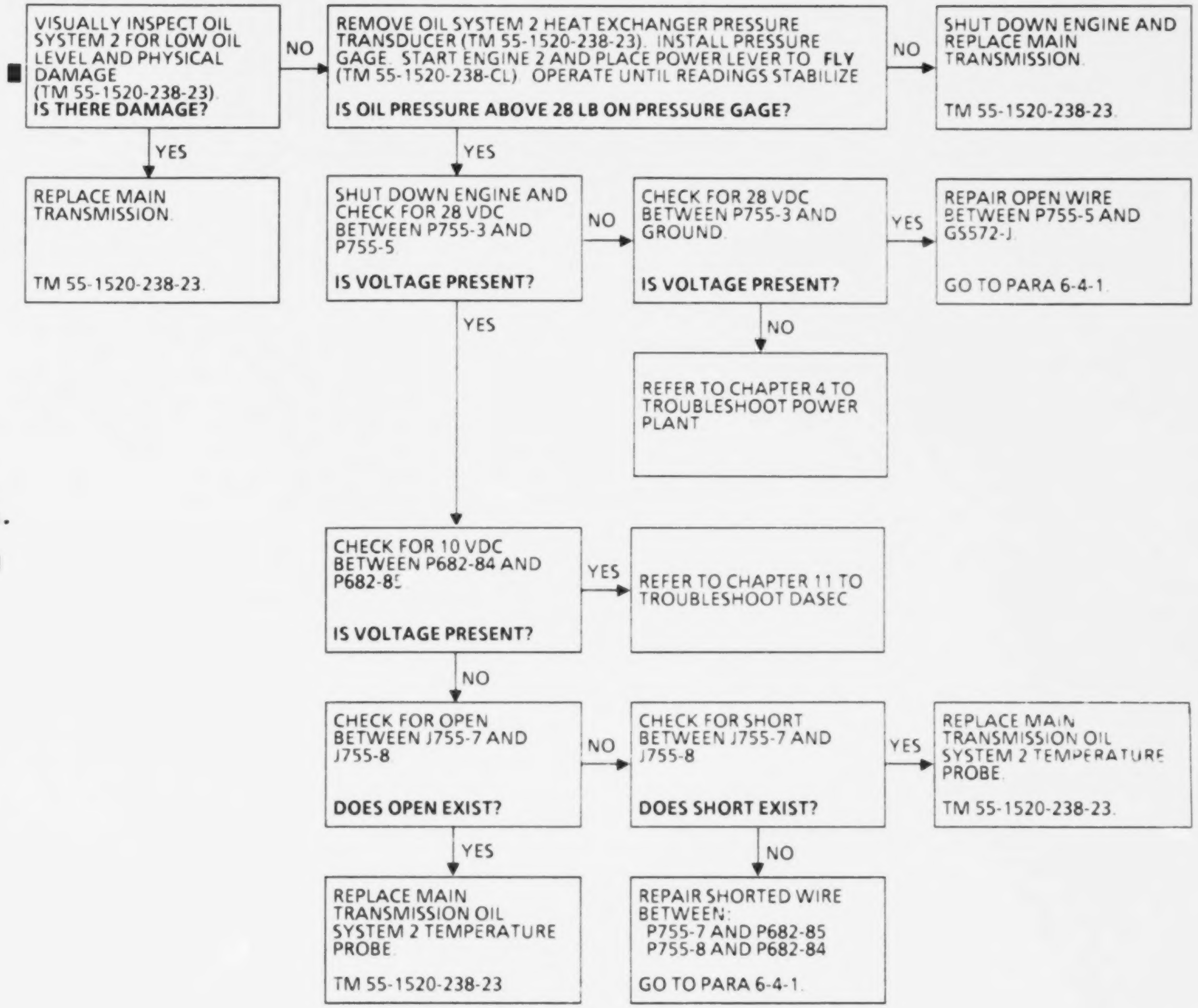
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R200 panel removed; R225 door open
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


VISUALLY INSPECT OIL SYSTEM 2 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
YES
REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.
NO
REMOVE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 2 AND PLACE POWER LEVER TO FLY (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE. IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?
NO
SHUT DOWN ENGINE AND REPLACE MAIN TRANSMISSION. TM 55-1520-238-23.
YES
SHUT DOWN ENGINE AND CHECK FOR 28 VDC BETWEEN P755-3 AND P755-5. IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN P755-3 AND GROUND. IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN P755-5 AND GS572-J. GO TO PARA 6-4-1.
NO
REFER TO CHAPTER 4 TO TROUBLESHOOT POWER PLANT.
YES
CHECK FOR 10 VDC BETWEEN P682-84 AND P682-85. IS VOLTAGE PRESENT?
YES
REFER TO CHAPTER 11 TO TROUBLESHOOT DASEC.
NO
CHECK FOR OPEN BETWEEN J755-7 AND J755-8. DOES OPEN EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 TEMPERATURE PROBE. TM 55-1520-238-23
NO
CHECK FOR SHORT BETWEEN J755-7 AND J755-8. DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 TEMPERATURE PROBE. TM 55-1520-238-23.
NO
REPAIR SHORTED WIRE BETWEEN: P755-7 AND P682-85 P755-8 AND P682-84 GO TO PARA 6-4-1.

END OF TASK

268-454

6-4-27. HOD XMN2 READING - DISPLAYS HIGH OIL TEMPERATURE

Personnel Required:

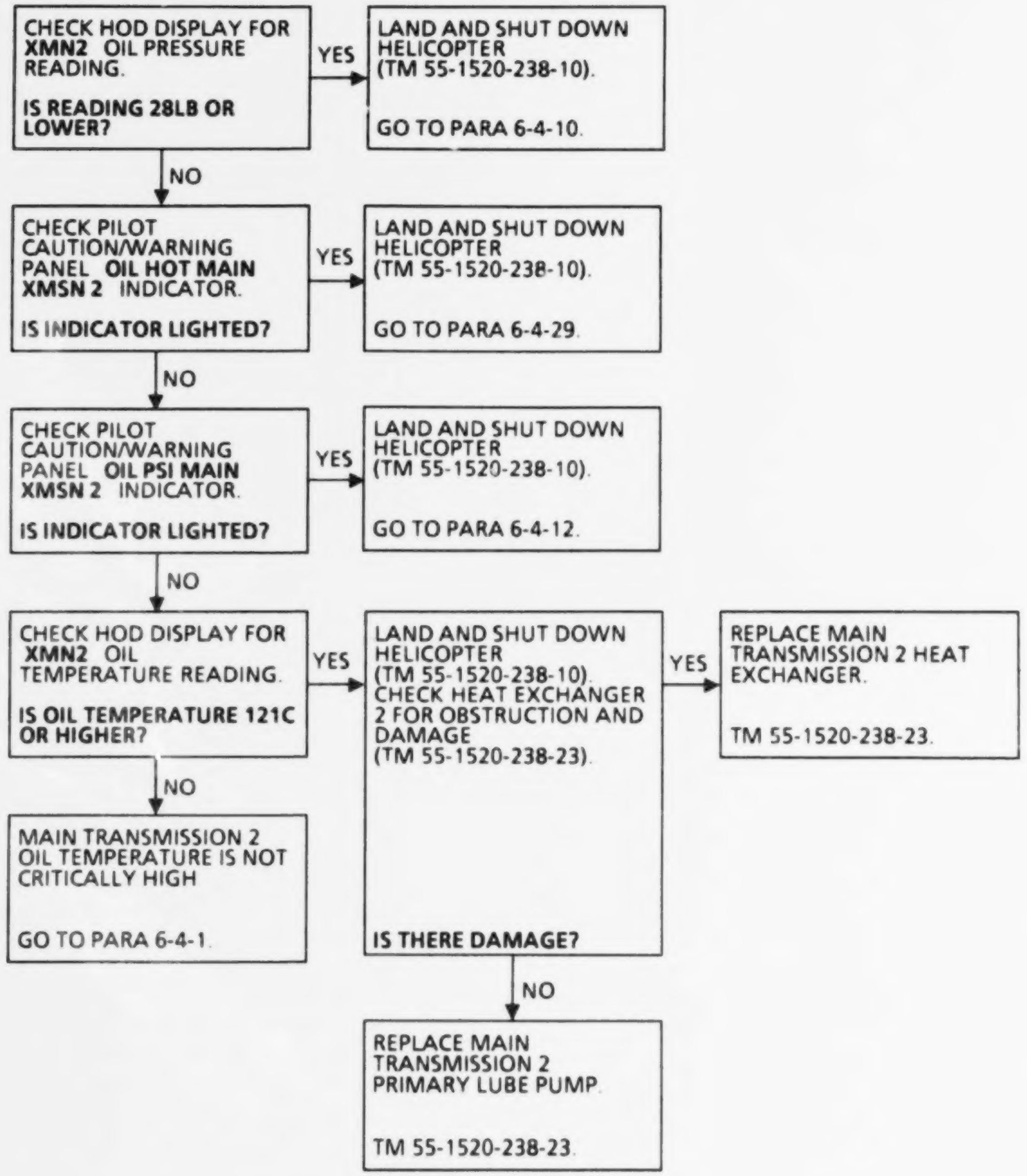
68D10	Aircraft Powertrain Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-10
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-10	Helicopter in hover


CHECK HOD DISPLAY FOR XMN2 OIL PRESSURE READING. IS READING 28LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). GO TO PARA 6-4-10.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL HOT MAIN XMSN 2 INDICATOR. IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). GO TO PARA 6-4-29.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL PSI MAIN XMSN 2 INDICATOR. IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). GO TO PARA 6-4-12.
NO
CHECK HOD DISPLAY FOR XMN2 OIL TEMPERATURE READING. IS OIL TEMPERATURE 121C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-10). CHECK HEAT EXCHANGER 2 FOR OBSTRUCTION AND DAMAGE (TM 55-1520-238-23). IS THERE DAMAGE?
YES
REPLACE MAIN TRANSMISSION 2 HEAT EXCHANGER. TM 55-1520-238-23.
NO
REPLACE MAIN TRANSMISSION 2 PRIMARY LUBE PUMP. TM 55-1520-238-23.
NO
MAIN TRANSMISSION 2 OIL TEMPERATURE IS NOT CRITICALLY HIGH GO TO PARA 6-4-1.

END OF TASK

6-4-28. OIL HOT MAIN XMSN 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL XMN1 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

68F10	Aircraft Electrician
67R10	Attack Helicopter Repairer
100KG	Pilot

References:

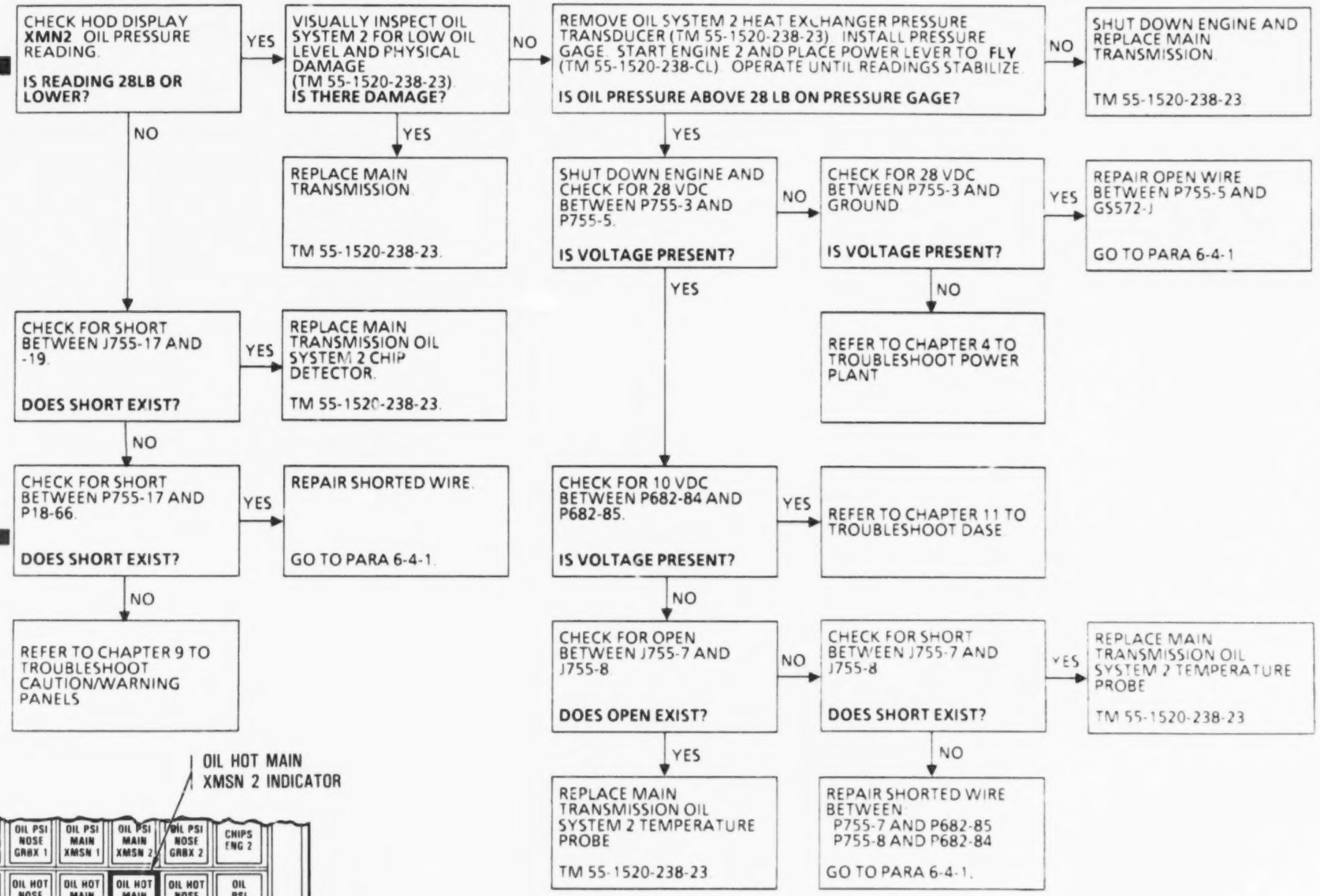
TM 55-1520-238-CL
TM 55-1520-238-23

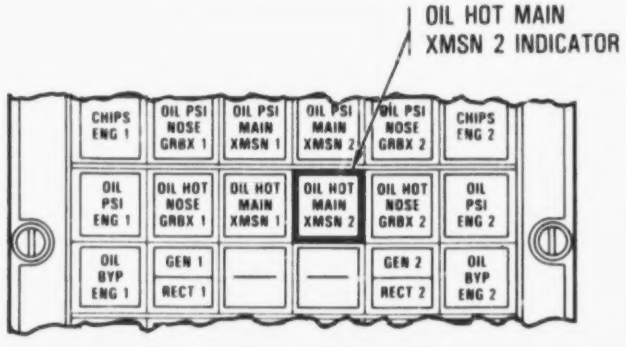
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK HOD DISPLAY XMN2 OIL PRESSURE READING.
IS READING 28LB OR LOWER?
YES
VISUALLY INSPECT OIL SYSTEM 2 FOR LOW OIL LEVEL AND PHYSICAL DAMAGE (TM 55-1520-238-23).
IS THERE DAMAGE?
NO
REMOVE OIL SYSTEM 2 HEAT EXCHANGER PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 2 AND PLACE POWER LEVER TO FLY (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE.
IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?
NO
SHUT DOWN ENGINE AND REPLACE MAIN TRANSMISSION.
TM 55-1520-238-23.
YES
REPLACE MAIN TRANSMISSION.
TM 55-1520-238-23.
YES
SHUT DOWN ENGINE AND CHECK FOR 28 VDC BETWEEN P755-3 AND P755-5.
IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC BETWEEN P755-3 AND GROUND.
IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN P755-5 AND GS572-J
GO TO PARA 6-4-1
NO
REFER TO CHAPTER 4 TO TROUBLESHOOT POWER PLANT
NO
CHECK FOR SHORT BETWEEN J755-17 AND -19.
DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 CHIP DETECTOR.
TM 55-1520-238-23.
NO
CHECK FOR SHORT BETWEEN P755-17 AND P18-66.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS
YES
CHECK FOR 10 VDC BETWEEN P682-84 AND P682-85.
IS VOLTAGE PRESENT?
YES
REFER TO CHAPTER 11 TO TROUBLESHOOT DASE
NO
CHECK FOR OPEN BETWEEN J755-7 AND J755-8.
DOES OPEN EXIST?
NO
CHECK FOR SHORT BETWEEN J755-7 AND J755-8.
DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 TEMPERATURE PROBE
TM 55-1520-238-23
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 TEMPERATURE PROBE
TM 55-1520-238-23
NO
REPAIR SHORTED WIRE BETWEEN
P755-7 AND P682-85
P755-8 AND P682-84
GO TO PARA 6-4-1.


OIL HOT MAIN XMSN 2 INDICATOR
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2

PILOT CAUTION/WARNING PANEL

MM04/1-1129

END OF TASK

6-4-29. OIL HOT MAIN XMSN 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS HIGH XMN2 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10	Aircraft Electrician
67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

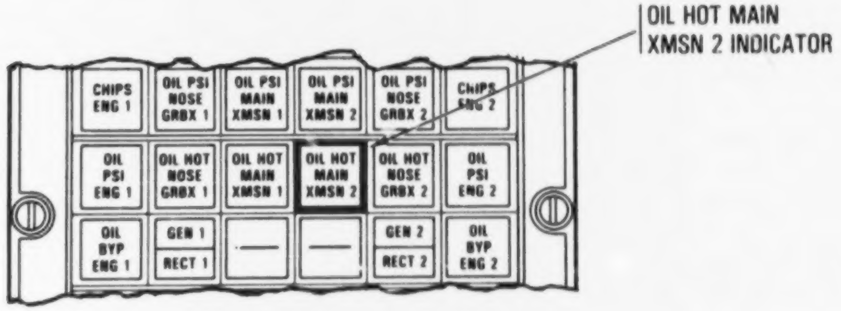
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter in hover

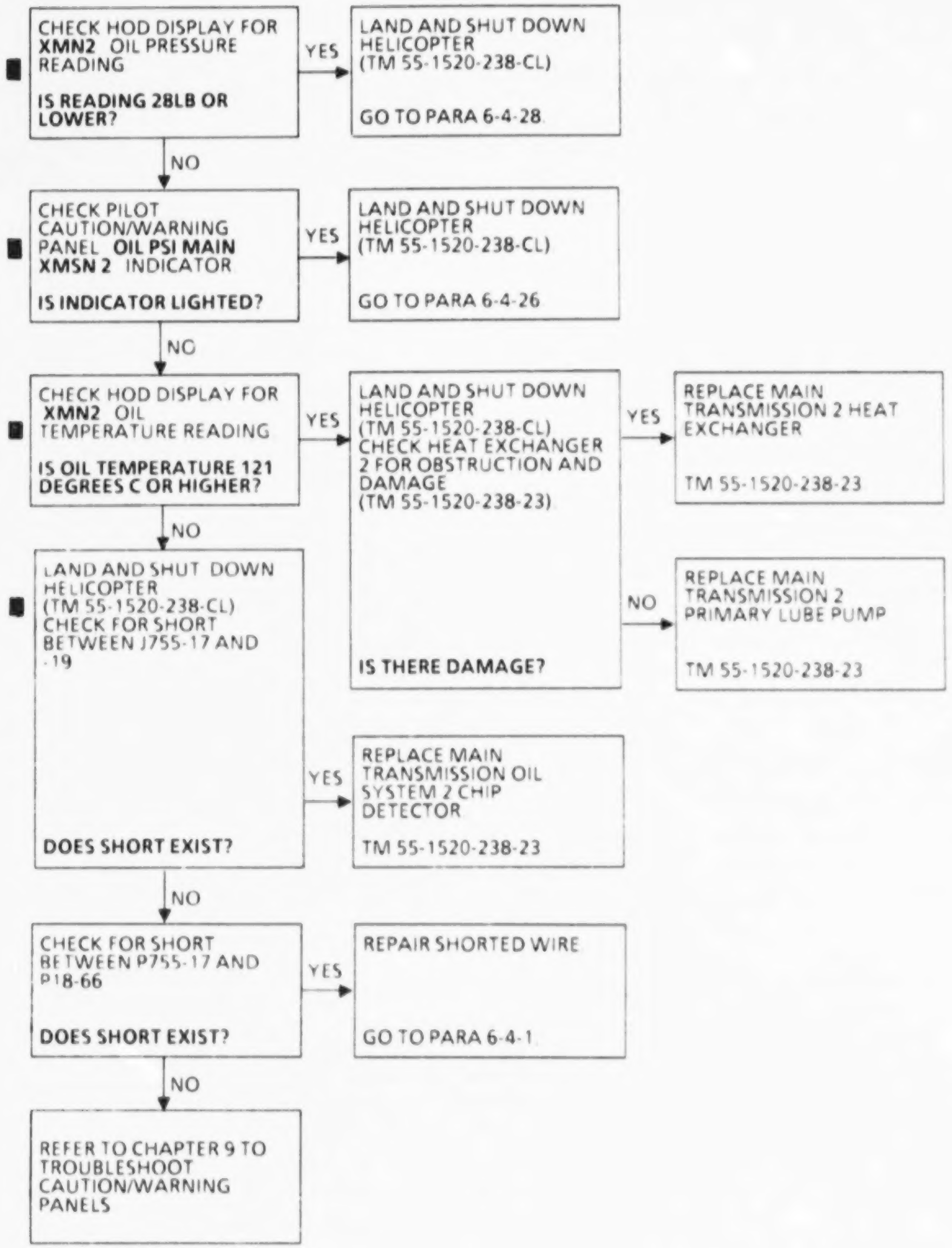
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OIL HOT MAIN XMSN 2 INDICATOR
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2

PILOT CAUTION/WARNING PANEL

MM04/1-1130


CHECK HOD DISPLAY FOR XMN2 OIL PRESSURE READING
IS READING 28LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL)
GO TO PARA 6-4-28
NO
CHECK PILOT CAUTION/WARNING PANEL OIL PSI MAIN XMSN 2 INDICATOR
IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL)
GO TO PARA 6-4-26
NO
CHECK HOD DISPLAY FOR XMN2 OIL TEMPERATURE READING
IS OIL TEMPERATURE 121 DEGREES C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL) CHECK HEAT EXCHANGER 2 FOR OBSTRUCTION AND DAMAGE (TM 55-1520-238-23)
IS THERE DAMAGE?
YES
REPLACE MAIN TRANSMISSION 2 HEAT EXCHANGER
TM 55-1520-238-23
NO
REPLACE MAIN TRANSMISSION 2 PRIMARY LUBE PUMP
TM 55-1520-238-23
NO
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL) CHECK FOR SHORT BETWEEN J755-17 AND -19
DOES SHORT EXIST?
YES
REPLACE MAIN TRANSMISSION OIL SYSTEM 2 CHIP DETECTOR
TM 55-1520-238-23
NO
CHECK FOR SHORT BETWEEN P755-17 AND P18-66
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE
GO TO PARA 6-4-1
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS

END OF TASK

6-4-30. HOD NGB2 READING - DISPLAYS 140 DEGREES C OR HIGHER OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

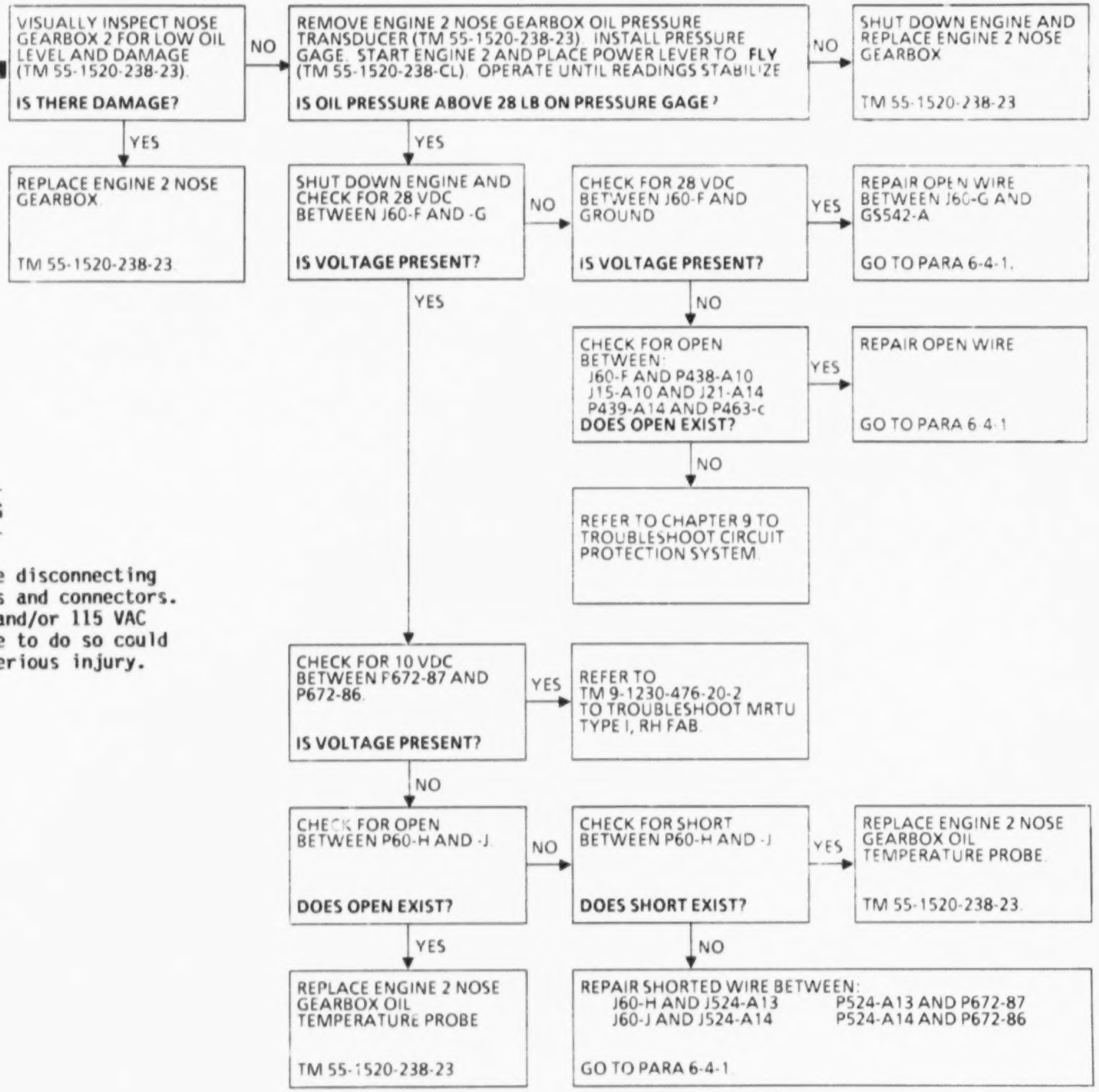
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN6, R60 fairing and R200 access doors open
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



VISUALLY INSPECT NOSE GEARBOX 2 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).

IS THERE DAMAGE?

REPLACE ENGINE 2 NOSE GEARBOX.

TM 55-1520-238-23.

REMOVE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 2 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE

IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?

SHUT DOWN ENGINE AND REPLACE ENGINE 2 NOSE GEARBOX

TM 55-1520-238-23

SHUT DOWN ENGINE AND CHECK FOR 28 VDC BETWEEN J60-F AND -G

IS VOLTAGE PRESENT?

CHECK FOR 28 VDC BETWEEN J60-F AND GROUND

IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN J60-G AND GS542-A

GO TO PARA 6-4-1.

CHECK FOR OPEN BETWEEN:
J60-F AND P438-A10
J15-A10 AND J21-A14
P439-A14 AND P463-c
DOES OPEN EXIST?

REPAIR OPEN WIRE

GO TO PARA 6-4-1

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

CHECK FOR 10 VDC BETWEEN F672-87 AND P672-86.

IS VOLTAGE PRESENT?

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, RH FAB.

CHECK FOR OPEN BETWEEN P60-H AND -J.

DOES OPEN EXIST?

CHECK FOR SHORT BETWEEN P60-H AND -J

DOES SHORT EXIST?

REPLACE ENGINE 2 NOSE GEARBOX OIL TEMPERATURE PROBE.

TM 55-1520-238-23.

REPLACE ENGINE 2 NOSE GEARBOX OIL TEMPERATURE PROBE

TM 55-1520-238-23

REPAIR SHORTED WIRE BETWEEN:
J60-H AND J524-A13 P524-A13 AND P672-87
J60-J AND J524-A14 P524-A14 AND P672-86

GO TO PARA 6-4-1.

END OF TASK

6-4-31. HOD NGB2 READING - DISPLAYS HIGH OIL TEMPERATURE

Personnel Required:

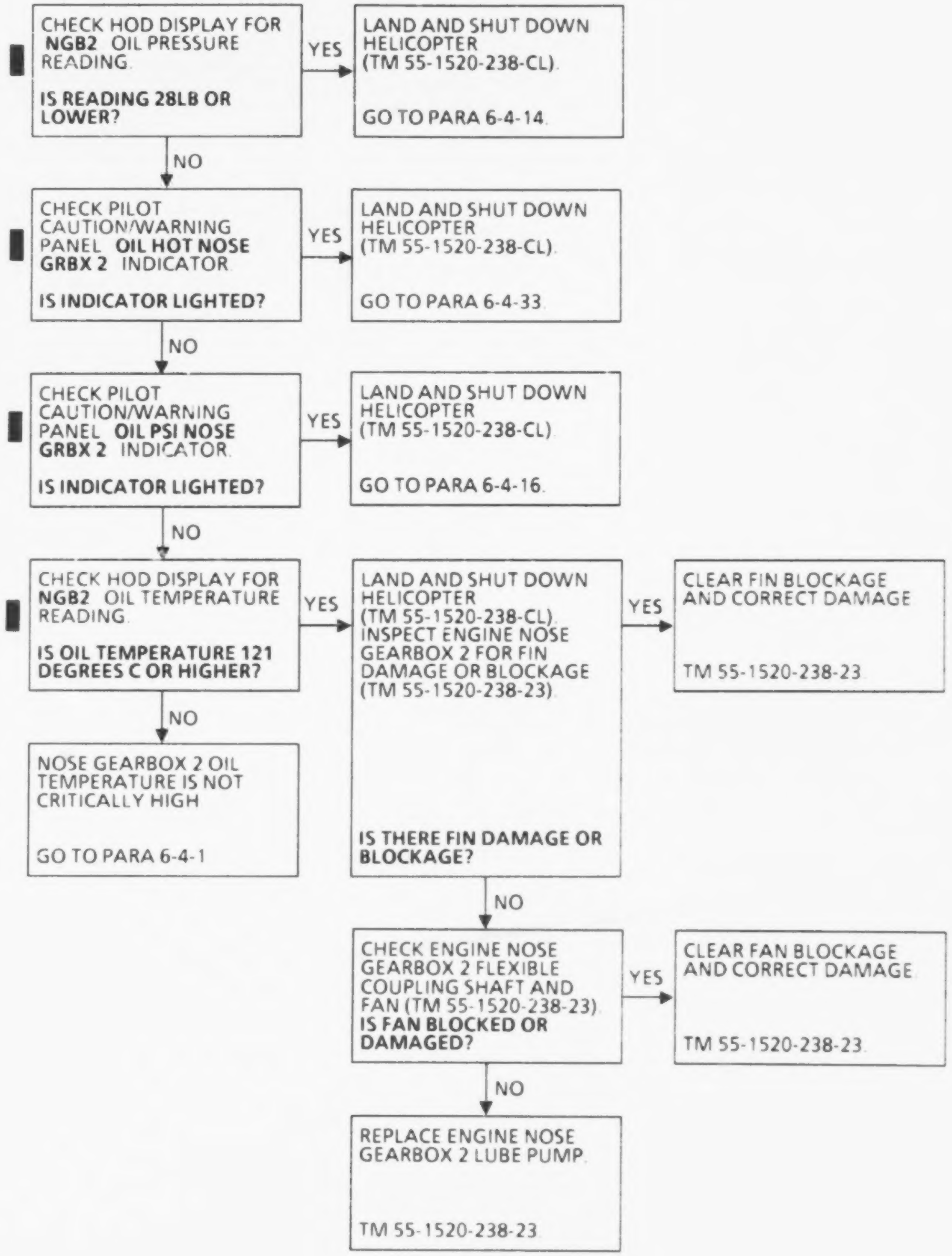
67R10	Attack Helicopter Repairer
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-CL	Helicopter in hover


CHECK HOD DISPLAY FOR NGB2 OIL PRESSURE READING. IS READING 28LB OR LOWER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-14.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL HOT NOSE GRBX 2 INDICATOR. IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-33.
NO
CHECK PILOT CAUTION/WARNING PANEL OIL PSI NOSE GRBX 2 INDICATOR. IS INDICATOR LIGHTED?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-16.
NO
CHECK HOD DISPLAY FOR NGB2 OIL TEMPERATURE READING. IS OIL TEMPERATURE 121 DEGREES C OR HIGHER?
YES
LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). INSPECT ENGINE NOSE GEARBOX 2 FOR FIN DAMAGE OR BLOCKAGE (TM 55-1520-238-23). IS THERE FIN DAMAGE OR BLOCKAGE?
YES
CLEAR FIN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23.
NO
NOSE GEARBOX 2 OIL TEMPERATURE IS NOT CRITICALLY HIGH. GO TO PARA 6-4-1.
NO
CHECK ENGINE NOSE GEARBOX 2 FLEXIBLE COUPLING SHAFT AND FAN (TM 55-1520-238-23). IS FAN BLOCKED OR DAMAGED?
YES
CLEAR FAN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23.
NO
REPLACE ENGINE NOSE GEARBOX 2 LUBE PUMP. TM 55-1520-238-23

END OF TASK

6-4-32. OIL HOT NOSE GRBX 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS NORMAL NGB2 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282
Gage, Pressure, Dial Indicating (0-200 PSI)	6685-00-846-9720
Adapter, Straight Pipe To Tube, Female Pipe End, 37° Flared	4730-00-802-2818

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

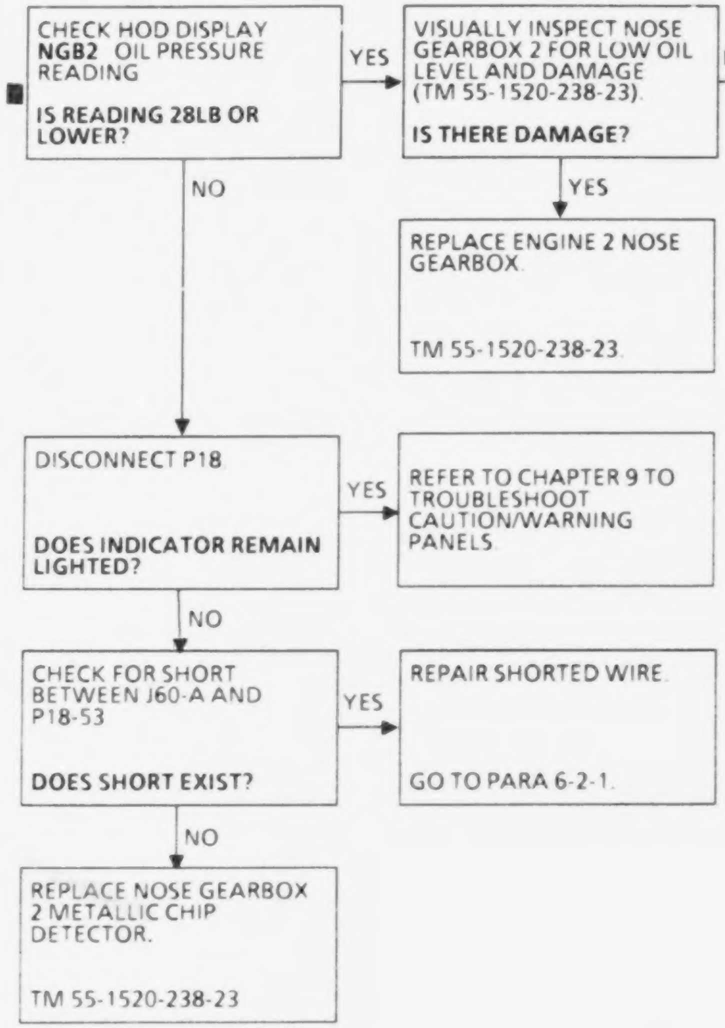
TM 9-1230-476-20-2
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK HOD DISPLAY **NGB2** OIL PRESSURE READING

IS READING 28LB OR LOWER?

YES

VISUALLY INSPECT NOSE GEARBOX 2 FOR LOW OIL LEVEL AND DAMAGE (TM 55-1520-238-23).

IS THERE DAMAGE?

YES

REPLACE ENGINE 2 NOSE GEARBOX.

TM 55-1520-238-23.

NO

DISCONNECT P18.

DOES INDICATOR REMAIN LIGHTED?

YES

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

NO

CHECK FOR SHORT BETWEEN J60-A AND P18-53

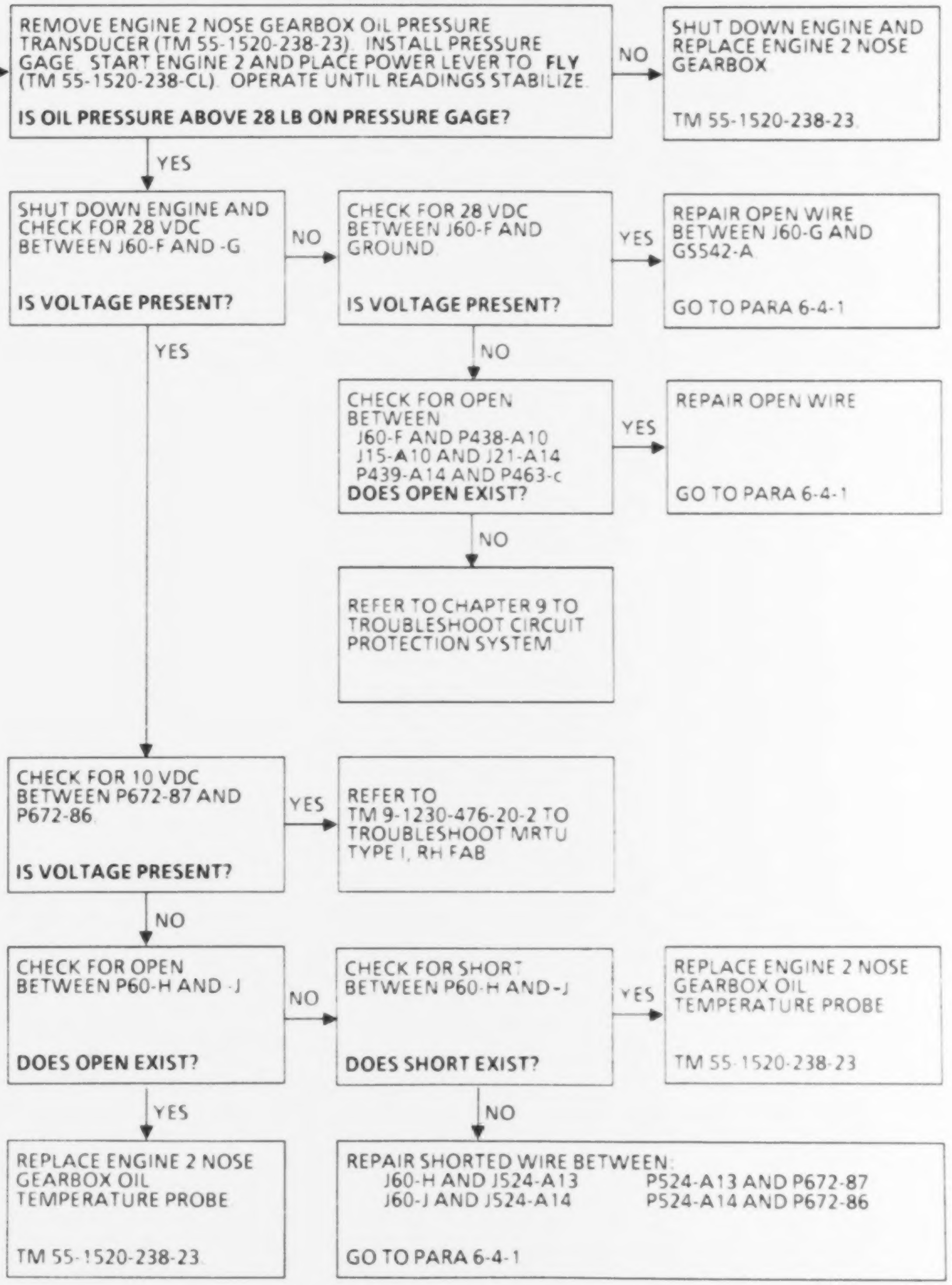
DOES SHORT EXIST?

REPAIR SHORTED WIRE.

GO TO PARA 6-2-1.

REPLACE NOSE GEARBOX 2 METALLIC CHIP DETECTOR.

TM 55-1520-238-23



REMOVE ENGINE 2 NOSE GEARBOX OIL PRESSURE TRANSDUCER (TM 55-1520-238-23). INSTALL PRESSURE GAGE. START ENGINE 2 AND PLACE POWER LEVER TO **FLY** (TM 55-1520-238-CL). OPERATE UNTIL READINGS STABILIZE.

IS OIL PRESSURE ABOVE 28 LB ON PRESSURE GAGE?

SHUT DOWN ENGINE AND REPLACE ENGINE 2 NOSE GEARBOX.

TM 55-1520-238-23.

SHUT DOWN ENGINE AND CHECK FOR 28 VDC BETWEEN J60-F AND -G.

IS VOLTAGE PRESENT?

CHECK FOR 28 VDC BETWEEN J60-F AND GROUND.

IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN J60-G AND GS542-A.

GO TO PARA 6-4-1.

CHECK FOR OPEN BETWEEN
J60-F AND P438-A10
J15-A10 AND J21-A14
P439-A14 AND P463-c
DOES OPEN EXIST?

REPAIR OPEN WIRE

GO TO PARA 6-4-1

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

CHECK FOR 10 VDC BETWEEN P672-87 AND P672-86.

IS VOLTAGE PRESENT?

REFER TO TM 9-1230-476-20-2 TO TROUBLESHOOT MRTU TYPE I, RH FAB.

CHECK FOR OPEN BETWEEN P60-H AND -J.

DOES OPEN EXIST?

REPLACE ENGINE 2 NOSE GEARBOX OIL TEMPERATURE PROBE.

TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN P60-H AND -J.

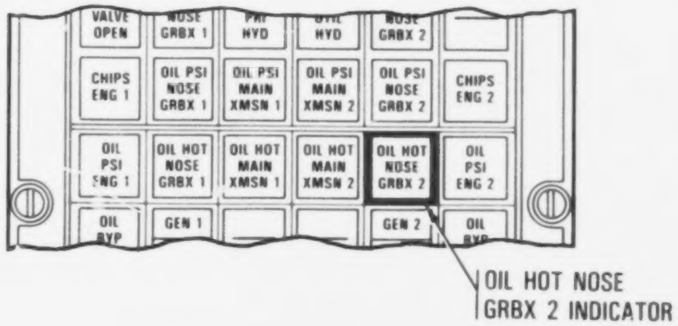
DOES SHORT EXIST?

REPLACE ENGINE 2 NOSE GEARBOX OIL TEMPERATURE PROBE

TM 55-1520-238-23

REPAIR SHORTED WIRE BETWEEN:
J60-H AND J524-A13 P524-A13 AND P672-87
J60-J AND J524-A14 P524-A14 AND P672-86

GO TO PARA 6-4-1


VALVE OPEN
NOSE GRBX 1
PRI HYD
UTIL HYD
NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP
GEN 1
GEN 2
OIL BYP
OIL HOT NOSE GRBX 2 INDICATOR

PILOT CAUTION/WARNING PANEL

END OF TASK

6-4-33. OIL HOT NOSE GRBX 2 INDICATOR - IS LIGHTED WHEN HOD DISPLAYS HIGH NGB2 OIL TEMPERATURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Aircraft Mechanic	5180-00-323-4692
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot
66R30	Inspector/Supervisor To assist pilot during test flight

References:

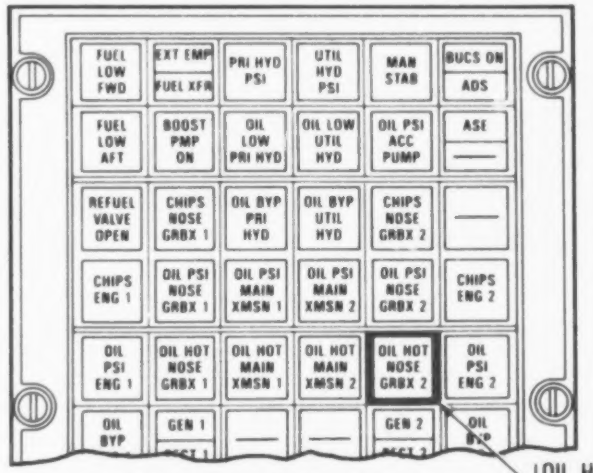
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	Helicopter in hover

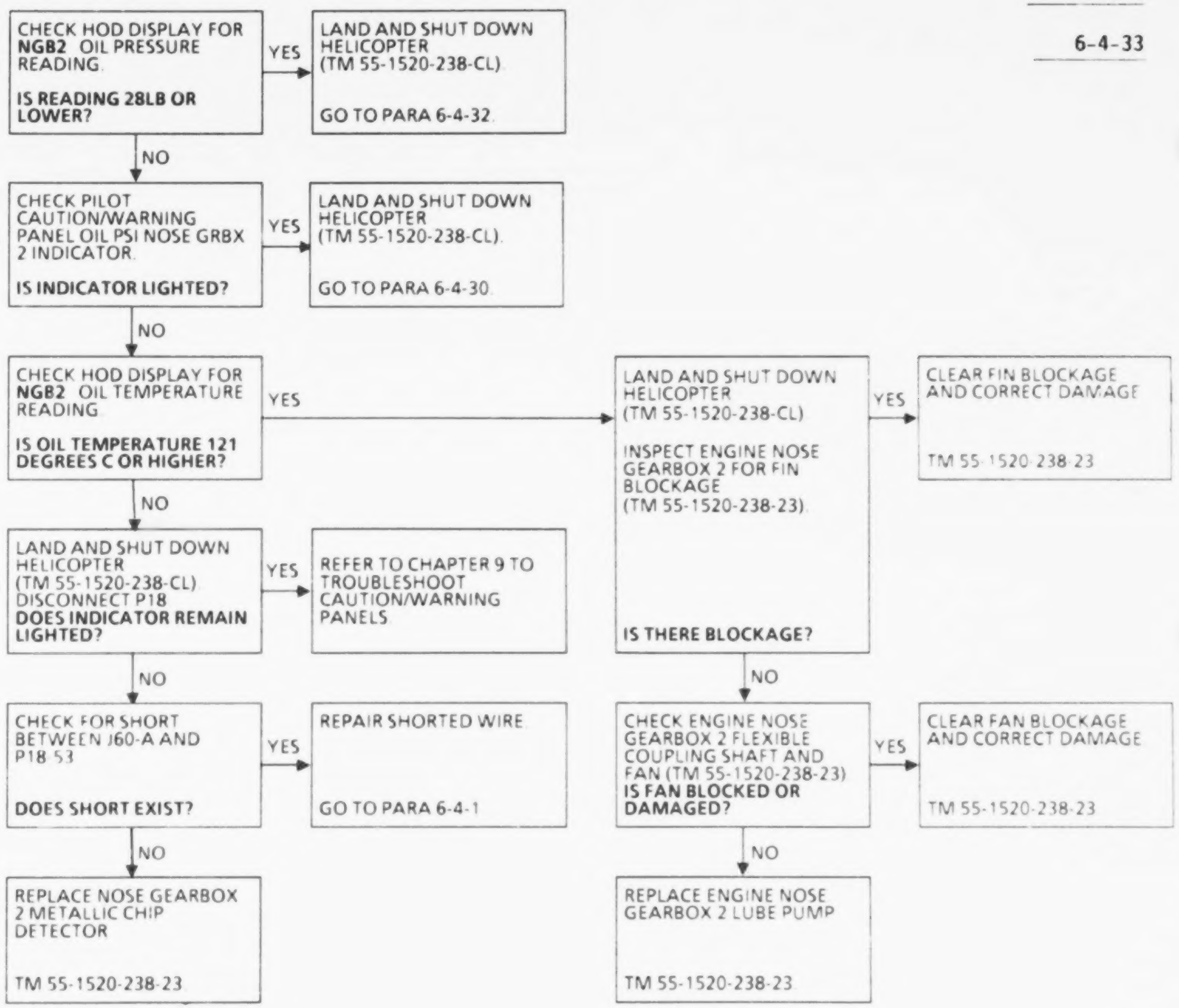
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP
GEN 1
GEN 2
OIL BYP

OIL HOT NOSE GRBX 2 INDICATOR

PILOT CAUTION/WARNING PANEL



CHECK HOD DISPLAY FOR **NGB2** OIL PRESSURE READING.

IS READING 28LB OR LOWER?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-32.

NO: CHECK PILOT CAUTION/WARNING PANEL OIL PSI NOSE GRBX 2 INDICATOR.

IS INDICATOR LIGHTED?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). GO TO PARA 6-4-30.

NO: CHECK HOD DISPLAY FOR **NGB2** OIL TEMPERATURE READING.

IS OIL TEMPERATURE 121 DEGREES C OR HIGHER?

YES: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). INSPECT ENGINE NOSE GEARBOX 2 FOR FIN BLOCKAGE (TM 55-1520-238-23).

IS THERE BLOCKAGE?

YES: CLEAR FIN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23

NO: CHECK ENGINE NOSE GEARBOX 2 FLEXIBLE COUPLING SHAFT AND FAN (TM 55-1520-238-23).

IS FAN BLOCKED OR DAMAGED?

YES: CLEAR FAN BLOCKAGE AND CORRECT DAMAGE. TM 55-1520-238-23

NO: REPLACE ENGINE NOSE GEARBOX 2 LUBE PUMP. TM 55-1520-238-23

NO: LAND AND SHUT DOWN HELICOPTER (TM 55-1520-238-CL). DISCONNECT P18.

DOES INDICATOR REMAIN LIGHTED?

YES: REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.

NO: CHECK FOR SHORT BETWEEN J60-A AND P18-53.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 6-4-1.

NO: REPLACE NOSE GEARBOX 2 METALLIC CHIP DETECTOR. TM 55-1520-238-23

MM04/1-1132

END OF TASK

6-4-34. TEMP INT INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Tester, Pyrometer and Thermocouple TH-299	6695-00-916-2473

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
	One person to assist
100KG	Pilot

References:

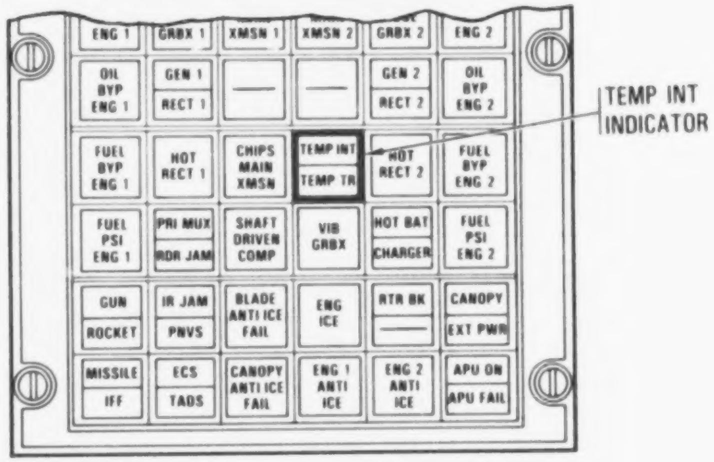
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L510, R510 fairings removed
TM 55-1520-238-10	Engine 1 operating
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

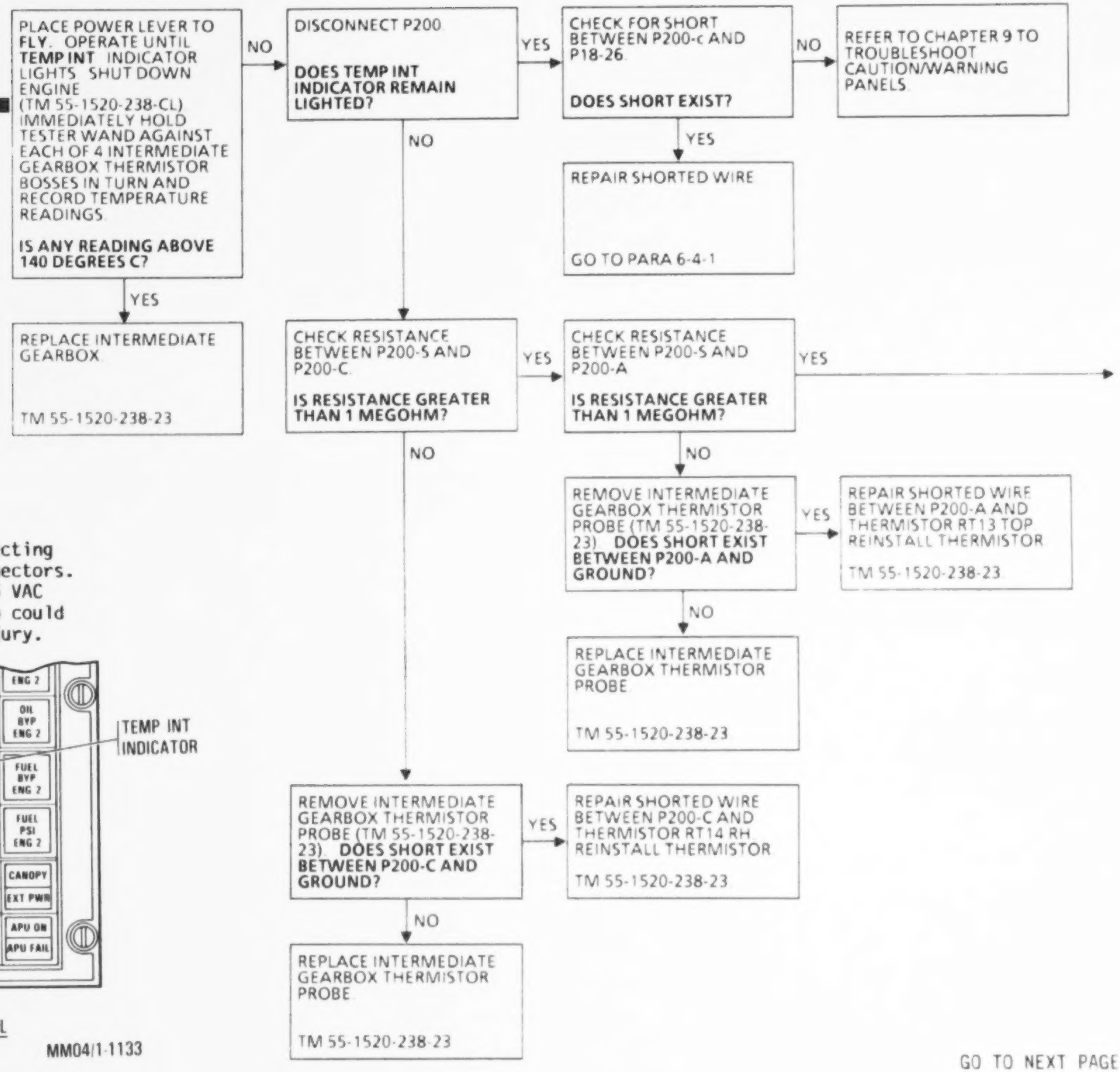
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ENG 1
GRBX 1
XMSN 1
XMSN 2
GRBX 2
ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL
TEMP INT INDICATOR

PILOT CAUTION/WARNING PANEL

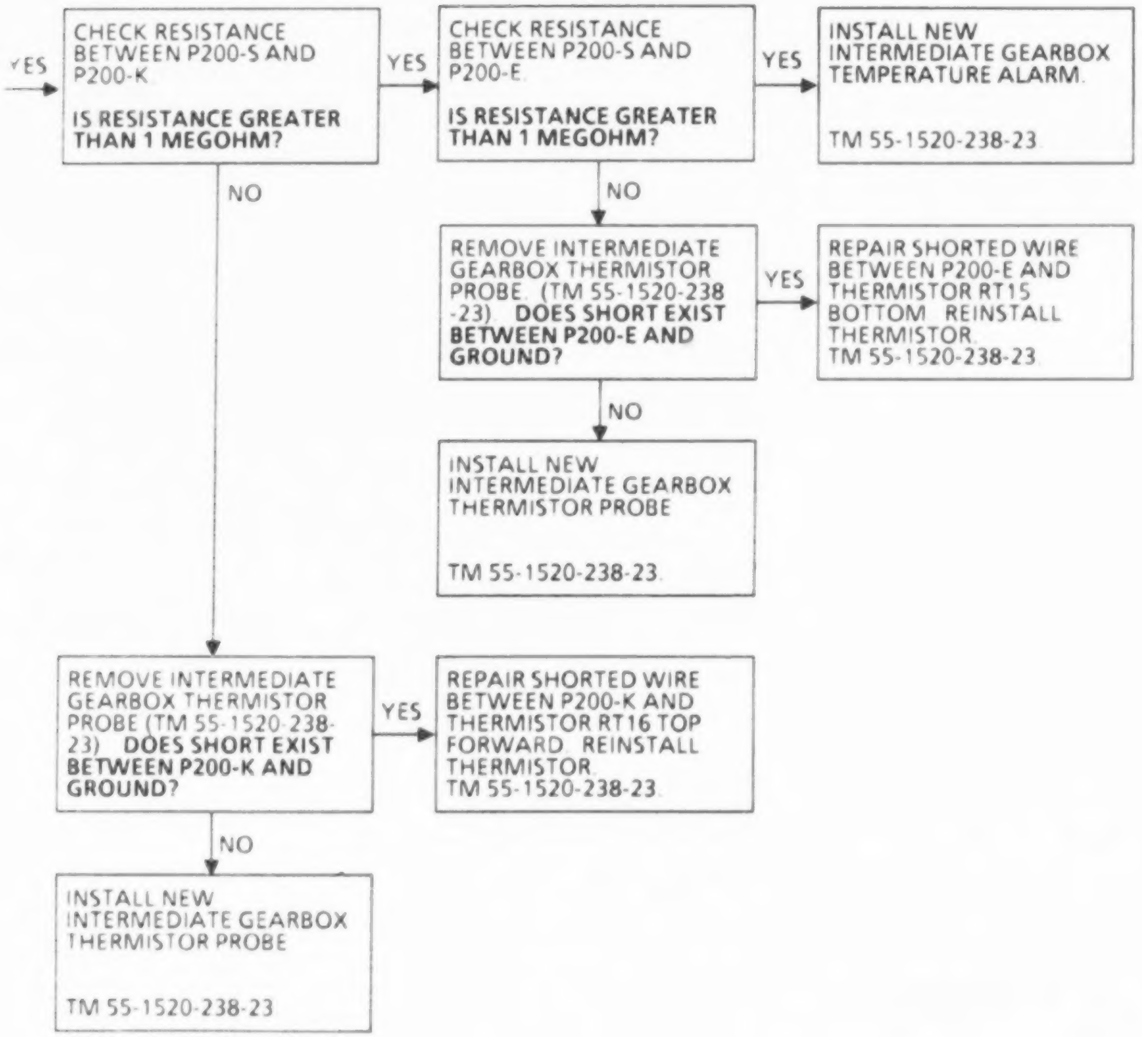
MM04/1-1133


PLACE POWER LEVER TO FLY. OPERATE UNTIL TEMP INT INDICATOR LIGHTS. SHUT DOWN ENGINE (TM 55-1520-238-CL) IMMEDIATELY HOLD TESTER WAND AGAINST EACH OF 4 INTERMEDIATE GEARBOX THERMISTOR BOSSES IN TURN AND RECORD TEMPERATURE READINGS.
IS ANY READING ABOVE 140 DEGREES C?
NO
DISCONNECT P200.
DOES TEMP INT INDICATOR REMAIN LIGHTED?
YES
CHECK FOR SHORT BETWEEN P200-c AND P18-26.
DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE
GO TO PARA 6-4-1
NO
YES
REPLACE INTERMEDIATE GEARBOX.
TM 55-1520-238-23
CHECK RESISTANCE BETWEEN P200-S AND P200-C.
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
CHECK RESISTANCE BETWEEN P200-S AND P200-A
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
NO
NO
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P200-A AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-A AND THERMISTOR RT13 TOP. REINSTALL THERMISTOR.
TM 55-1520-238-23
NO
REPLACE INTERMEDIATE GEARBOX THERMISTOR PROBE
TM 55-1520-238-23
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). DOES SHORT EXIST BETWEEN P200-C AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-C AND THERMISTOR RT14 RH. REINSTALL THERMISTOR.
TM 55-1520-238-23
NO
REPLACE INTERMEDIATE GEARBOX THERMISTOR PROBE.
TM 55-1520-238-23

GO TO NEXT PAGE

268-454

6-4-34. TEMP INT INDICATOR - LIGHTS (cont)


YES
CHECK RESISTANCE BETWEEN P200-S AND P200-K.
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
CHECK RESISTANCE BETWEEN P200-S AND P200-E.
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
INSTALL NEW INTERMEDIATE GEARBOX TEMPERATURE ALARM.
TM 55-1520-238-23
NO
NO
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE. (TM 55-1520-238-23) DOES SHORT EXIST BETWEEN P200-E AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-E AND THERMISTOR RT15 BOTTOM. REINSTALL THERMISTOR.
TM 55-1520-238-23
NO
INSTALL NEW INTERMEDIATE GEARBOX THERMISTOR PROBE
TM 55-1520-238-23.
REMOVE INTERMEDIATE GEARBOX THERMISTOR PROBE (TM 55-1520-238-23) DOES SHORT EXIST BETWEEN P200-K AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P200-K AND THERMISTOR RT16 TOP FORWARD. REINSTALL THERMISTOR.
TM 55-1520-238-23.
NO
INSTALL NEW INTERMEDIATE GEARBOX THERMISTOR PROBE
TM 55-1520-238-23

END OF TASK

6-4-35. TEMP TR INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282
Tester, Pyrometer and Thermocouple TH-299	6695-00-916-2473

Personnel Required:

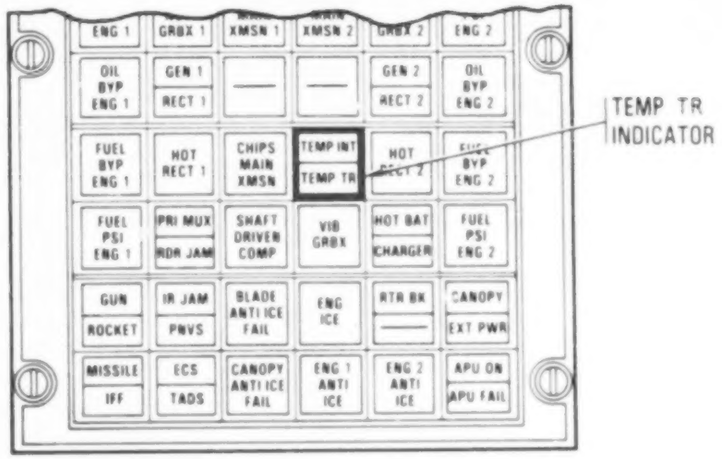
68F10	Aircraft Electrician One person to assist
100KG	Pilot

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L510, R510, L530, and R540 fairings removed
TM 55-1520-238-CL	Engine 1 operating
Para 1-3-2	ICS connected
Para 6-1-4	DRIVE SYSTEM - POWER UP completed


ENG 1
GRBX 1
XMSN 1
XMSN 2
GRBX 2
ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL
TEMP TR INDICATOR

PILOT CAUTION/WARNING PANEL

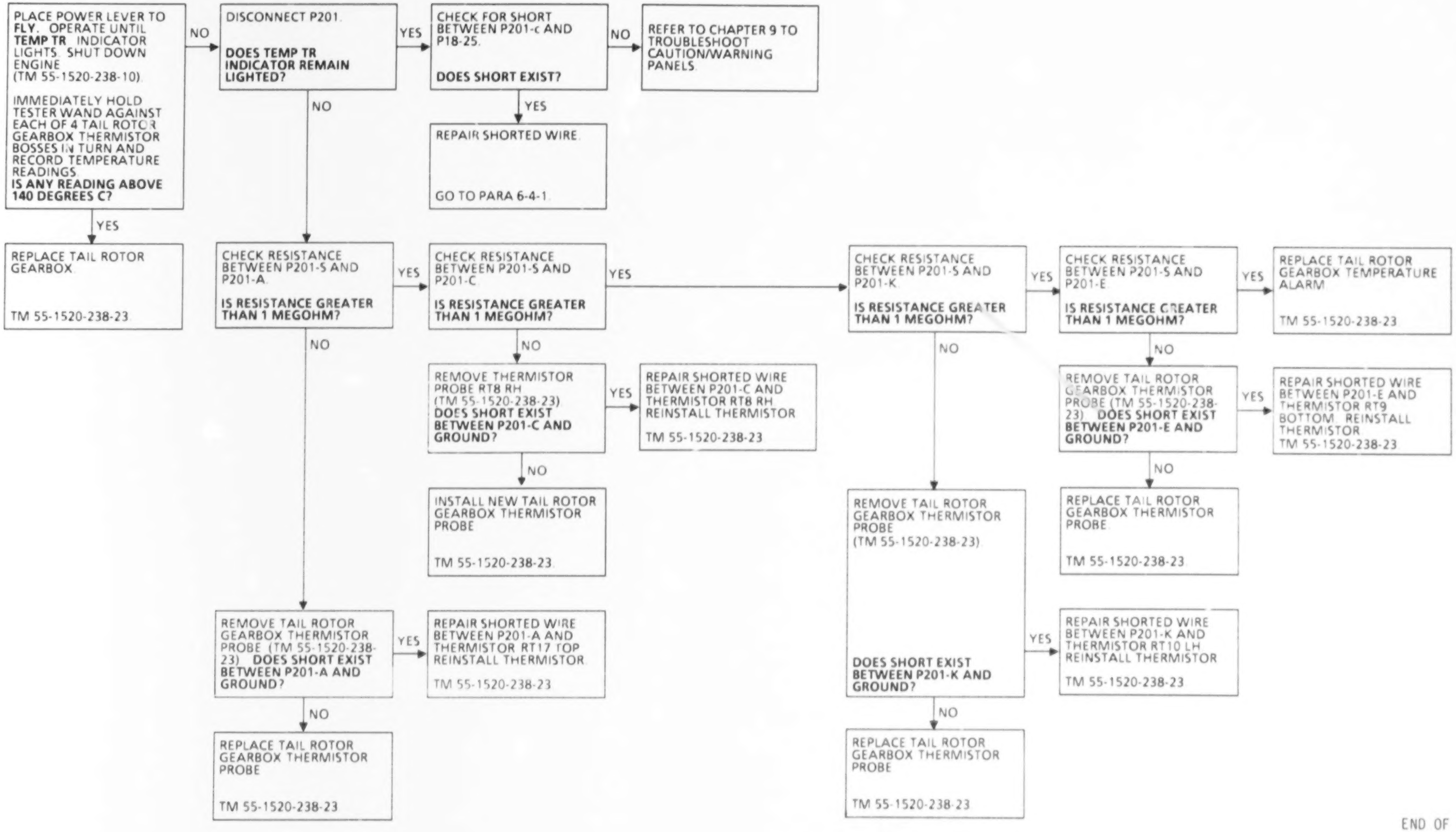
MM04/1-1134

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

GO TO NEXT PAGE

6-4-35. TEMP TR INDICATOR - LIGHTS (cont)


PLACE POWER LEVER TO **FLY**. OPERATE UNTIL **TEMP TR** INDICATOR LIGHTS. SHUT DOWN ENGINE (TM 55-1520-238-10).
IMMEDIATELY HOLD TESTER WAND AGAINST EACH OF 4 TAIL ROTOR GEARBOX THERMISTOR BOSSES IN TURN AND RECORD TEMPERATURE READINGS.
IS ANY READING ABOVE 140 DEGREES C?
NO
DISCONNECT P201.
DOES TEMP TR INDICATOR REMAIN LIGHTED?
YES
CHECK FOR SHORT BETWEEN P201-c AND P18-25.
DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.
NO
YES
REPLACE TAIL ROTOR GEARBOX.
TM 55-1520-238-23.
CHECK RESISTANCE BETWEEN P201-S AND P201-A.
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
CHECK RESISTANCE BETWEEN P201-S AND P201-C.
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
CHECK RESISTANCE BETWEEN P201-S AND P201-K.
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
CHECK RESISTANCE BETWEEN P201-S AND P201-E.
IS RESISTANCE GREATER THAN 1 MEGOHM?
YES
REPLACE TAIL ROTOR GEARBOX TEMPERATURE ALARM.
TM 55-1520-238-23
NO
NO
REMOVE THERMISTOR PROBE RT8 RH (TM 55-1520-238-23). **DOES SHORT EXIST BETWEEN P201-C AND GROUND?**
YES
REPAIR SHORTED WIRE BETWEEN P201-C AND THERMISTOR RT8 RH. REINSTALL THERMISTOR.
TM 55-1520-238-23
NO
INSTALL NEW TAIL ROTOR GEARBOX THERMISTOR PROBE.
TM 55-1520-238-23.
NO
NO
REMOVE TAIL ROTOR GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). **DOES SHORT EXIST BETWEEN P201-E AND GROUND?**
YES
REPAIR SHORTED WIRE BETWEEN P201-E AND THERMISTOR RT9 BOTTOM. REINSTALL THERMISTOR.
TM 55-1520-238-23
NO
REPLACE TAIL ROTOR GEARBOX THERMISTOR PROBE.
TM 55-1520-238-23
REMOVE TAIL ROTOR GEARBOX THERMISTOR PROBE (TM 55-1520-238-23).
DOES SHORT EXIST BETWEEN P201-K AND GROUND?
YES
REPAIR SHORTED WIRE BETWEEN P201-K AND THERMISTOR RT10 LH. REINSTALL THERMISTOR.
TM 55-1520-238-23
NO
REPLACE TAIL ROTOR GEARBOX THERMISTOR PROBE.
TM 55-1520-238-23
REMOVE TAIL ROTOR GEARBOX THERMISTOR PROBE (TM 55-1520-238-23). **DOES SHORT EXIST BETWEEN P201-A AND GROUND?**
YES
REPAIR SHORTED WIRE BETWEEN P201-A AND THERMISTOR RT17 TOP. REINSTALL THERMISTOR.
TM 55-1520-238-23
NO
REPLACE TAIL ROTOR GEARBOX THERMISTOR PROBE.
TM 55-1520-238-23

END OF TASK

6-4-36. CHIPS NOSE GRBX 1 INDICATOR - LIGHTS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

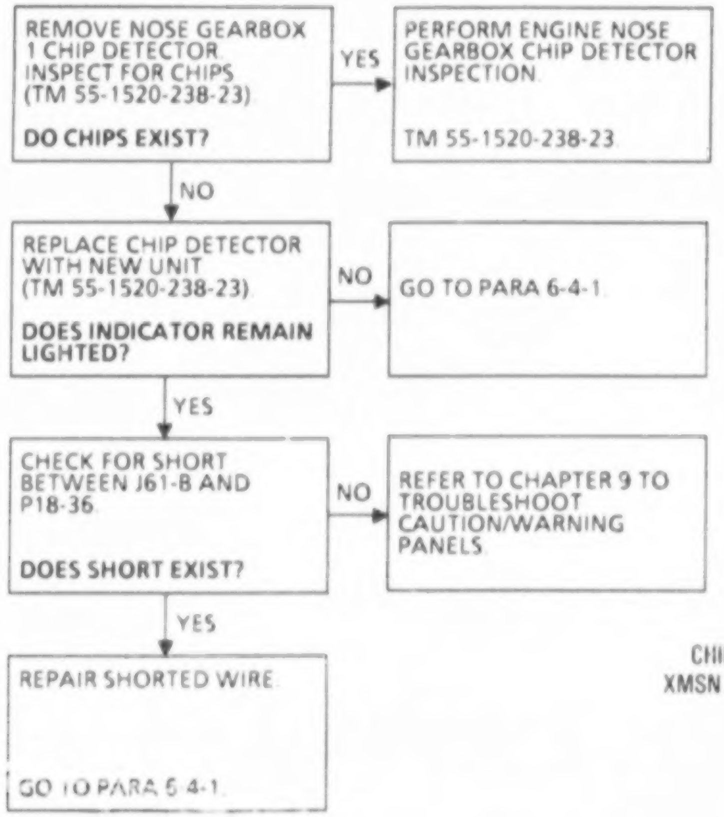
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L200 access door open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


REMOVE NOSE GEARBOX 1 CHIP DETECTOR. INSPECT FOR CHIPS (TM 55-1520-238-23).
DO CHIPS EXIST?
YES
PERFORM ENGINE NOSE GEARBOX CHIP DETECTOR INSPECTION.
TM 55-1520-238-23.
NO
REPLACE CHIP DETECTOR WITH NEW UNIT (TM 55-1520-238-23).
DOES INDICATOR REMAIN LIGHTED?
NO
GO TO PARA 6-4-1.
YES
CHECK FOR SHORT BETWEEN J61-B AND P18-36.
DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.

END OF TASK

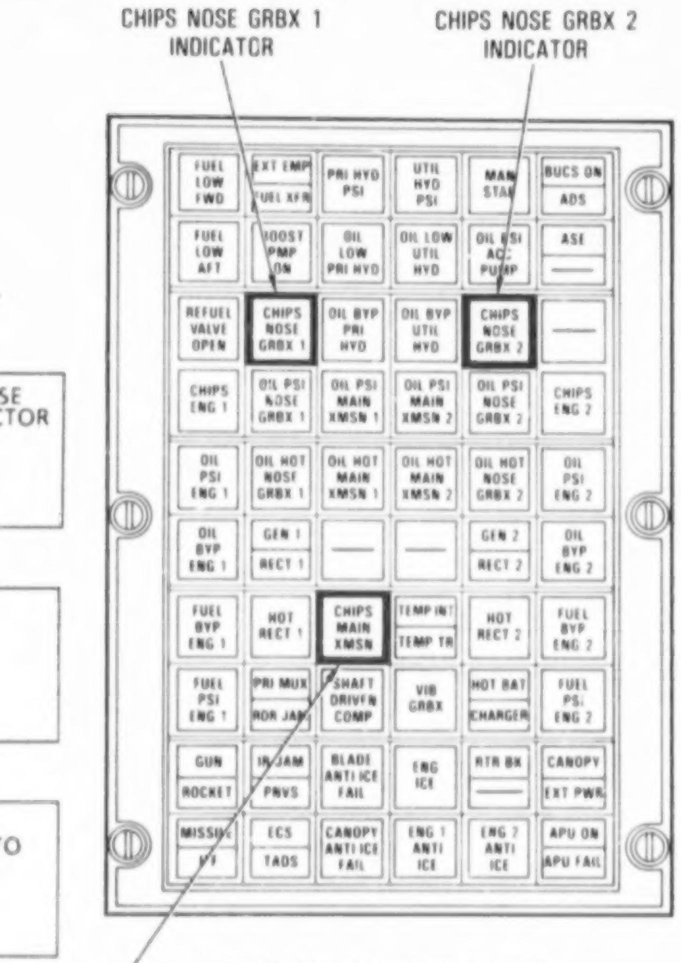
6-4-37. CHIPS NOSE GRBX 2 INDICATOR - LIGHTS

Tools: (para 6-4-36)

Personnel Required: (para 6-4-36)

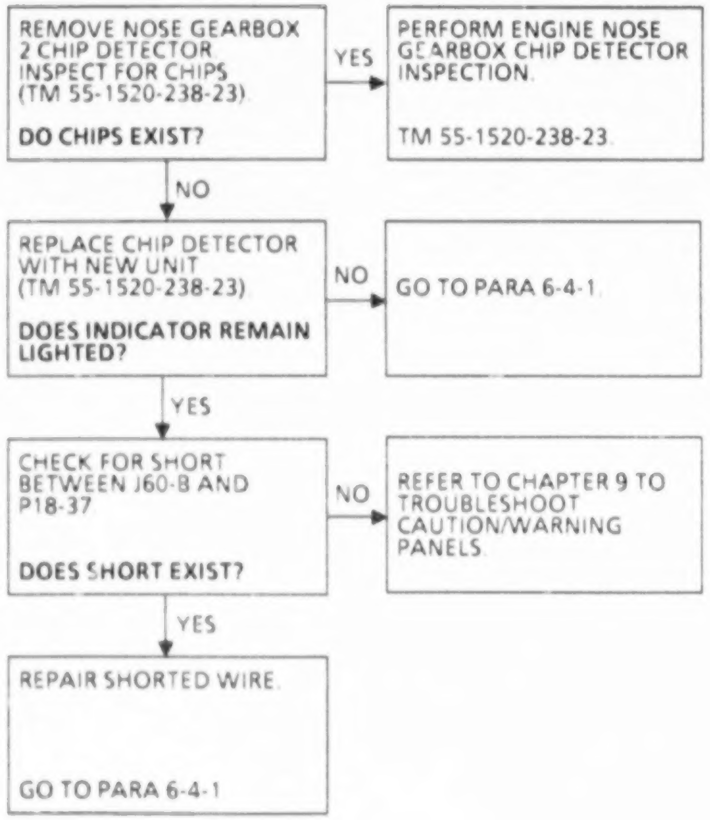
References: (para 6-4-36)

Equipment Conditions: (para 6-4-36)


CHIPS NOSE GRBX 1 INDICATOR
CHIPS NOSE GRBX 2 INDICATOR
CHIPS MAIN XMSN INDICATOR

PILOT CAUTION/WARNING PANEL

MM04/1-1135


REMOVE NOSE GEARBOX 2 CHIP DETECTOR. INSPECT FOR CHIPS (TM 55-1520-238-23).
DO CHIPS EXIST?
YES
PERFORM ENGINE NOSE GEARBOX CHIP DETECTOR INSPECTION.
TM 55-1520-238-23.
NO
REPLACE CHIP DETECTOR WITH NEW UNIT (TM 55-1520-238-23).
DOES INDICATOR REMAIN LIGHTED?
NO
GO TO PARA 6-4-1.
YES
CHECK FOR SHORT BETWEEN J60-B AND P18-37.
DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.

END OF TASK

6-4-38. CHIPS MAIN XMSN INDICATOR - LIGHTS

Tools: (para 6-4-36)

Personnel Required: (para 6-4-36)

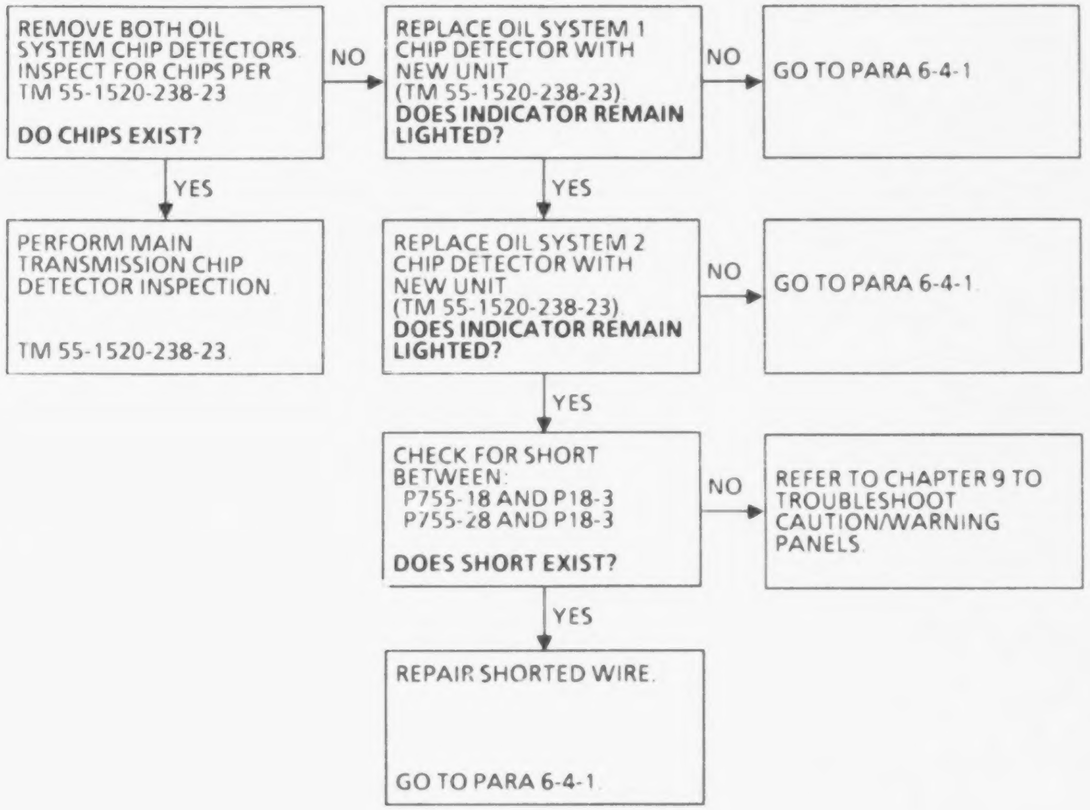
References: (para 6-4-36)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed Access provisions - L200 and R200 access doors open
Para 6-1-4	DRIVE SYSTEM - POWER UP completed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


REMOVE BOTH OIL SYSTEM CHIP DETECTORS. INSPECT FOR CHIPS PER TM 55-1520-238-23
DO CHIPS EXIST?
NO
REPLACE OIL SYSTEM 1 CHIP DETECTOR WITH NEW UNIT (TM 55-1520-238-23)
DOES INDICATOR REMAIN LIGHTED?
NO
GO TO PARA 6-4-1
YES
PERFORM MAIN TRANSMISSION CHIP DETECTOR INSPECTION.
TM 55-1520-238-23.
YES
REPLACE OIL SYSTEM 2 CHIP DETECTOR WITH NEW UNIT (TM 55-1520-238-23)
DOES INDICATOR REMAIN LIGHTED?
NO
GO TO PARA 6-4-1.
YES
CHECK FOR SHORT BETWEEN:
P755-18 AND P18-3
P755-28 AND P18-3
DOES SHORT EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING PANELS.
YES
REPAIR SHORTED WIRE.
GO TO PARA 6-4-1.

END OF TASK

6-4-39. ENGINE NOSE GEARBOX OIL LOSS IS INDICATED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692

Personnel Required:

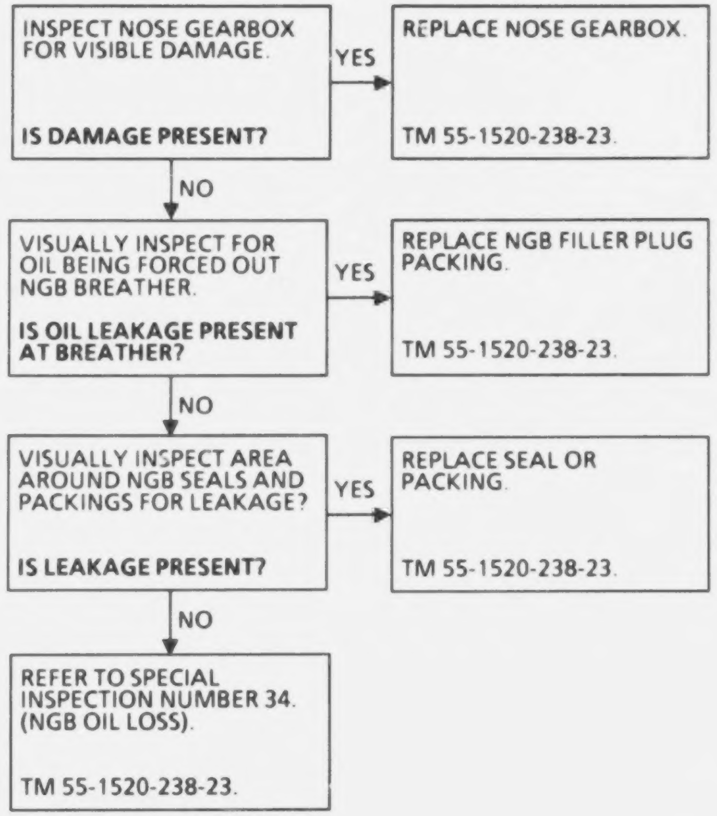
67R10 Attack Helicopter Repairer

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



INSPECT NOSE GEARBOX FOR VISIBLE DAMAGE.

IS DAMAGE PRESENT?

REPLACE NOSE GEARBOX.

TM 55-1520-238-23.

VISUALLY INSPECT FOR OIL BEING FORCED OUT NGB BREATHER.

IS OIL LEAKAGE PRESENT AT BREATHER?

REPLACE NGB FILLER PLUG PACKING.

TM 55-1520-238-23.

VISUALLY INSPECT AREA AROUND NGB SEALS AND PACKINGS FOR LEAKAGE?

IS LEAKAGE PRESENT?

REPLACE SEAL OR PACKING.

TM 55-1520-238-23.

REFER TO SPECIAL INSPECTION NUMBER 34. (NGB OIL LOSS).

TM 55-1520-238-23.

END OF TASK

CHAPTER 7. HYDRAULIC AND PNEUMATIC SYSTEMS

CHAPTER OVERVIEW

Chapter 7 contains the operational checks and fault isolation procedures required for troubleshooting the hydraulic and pneumatic systems.

Hydraulic and pneumatic system maintenance information is in TM 55-1520-238-23.

Chapter 7 is divided into the following sections:

Section	Para	Title
I	7-1-1	Failure Symptom List
II	7-2-1	Primary Hydraulic System-Operational Check
III	7-3-1	Utility Hydraulic System-Operational Check
IV	7-4-1	Pressurized Air System-Operational Check

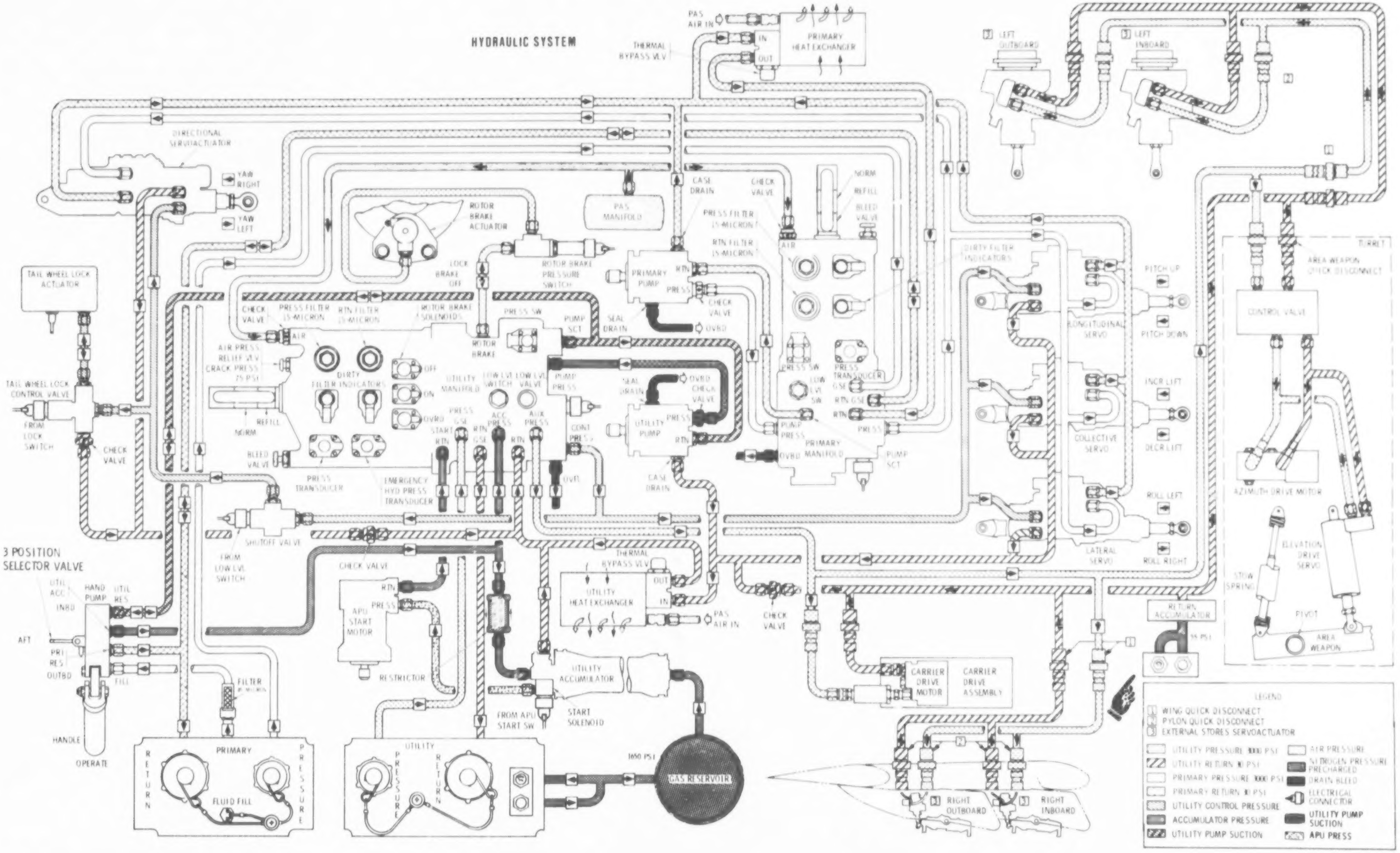
7-1-1. HYDRAULIC AND PNEUMATIC SYSTEMS - FAILURE SYMPTOM LIST

Symptom	Go to Para
A. Primary Hydraulic System - Operational Check:	
1. **PRI HYD** gage does not indicate **3000 PSI** (GPU operation).	7-2-1
2. Hydraulic hand pump does not service PRI HYD manifold reservoir.	7-2-1
3. **PRI HYD PSI** caution light is on.	7-2-1
4. **OIL LOW PRI HYD** caution light is on.	7-2-1
5. **OIL BYP PRI HYD** indicator is on.	7-2-1
6. **PRI HYD** caution light is on.	7-2-1
7. **PRI HYD** gage does not indicate **3000 PSI** (APU operating).	7-2-1
8. Dual hydraulic pressure indicator edge-light does not light.	7-2-1
9. **PRI HYD PSI** indicator - is not lighted with no primary hydraulic system pressure indicated.	7-2-1

Symptom	Go to Para
B. Utility Hydraulic System - Operational Check:	
1. **UTIL HYD** gage does not indicate **3000 PSI** (GPU operating.	7-3-1
2. Hydraulic hand pump does not service UTIL HYD manifold reservoir.	7-3-1
3. **UTIL HYD PSI** indicator is lighted.	7-3-1
4. **OIL LOW UTIL HYD** indicator is lighted.	7-3-1
5. **OIL BYP UTIL HYD** caution light is on.	7-3-1
6. **UTIL HYD** caution light is on.	7-3-1
7. **UTIL HYD** gage does not indicate **3000 PSI** (APU operating).	7-3-1
8. Emergency hydraulic flight controls do not function properly.	7-3-1
9. **RTR BK** caution light is off.	7-3-1
10. Rotor brake does not release.	7-3-1
11. Rotor brake does not stop rotor rotation.	7-3-1
12. **TAIL WHEEL** advisory light is not lighted.	7-3-1
13. **TAIL WHEEL LOCK** actuator does not unlock tail wheel.	7-3-1
14. **EMERG HYD** circuit breaker - does not stay closed.	7-3-1
15. **RTR BRK** circuit breaker - does not stay closed.	7-3-1
16. **RTR BK** caution light stays on with rotor brake released.	7-3-1
17. **TWHL LOCK** circuit breaker (CB59) - does not stay closed.	7-3-1
18. **UTIL ACC** gage does not indicate **3000 PSI**.	7-3-1
19. **UTIL ACC PSI X1000** indicator edge light does not come on.	7-3-1
20. **TAIL WHEEL** lock panel edge light does not come on.	7-3-1
21. Emergency hydraulic power edge-light - does not come on.	7-3-1
22. **OIL PSI UTIL HYD** caution light - is not on with no utility hydraulic system pressure indicated.	7-3-1

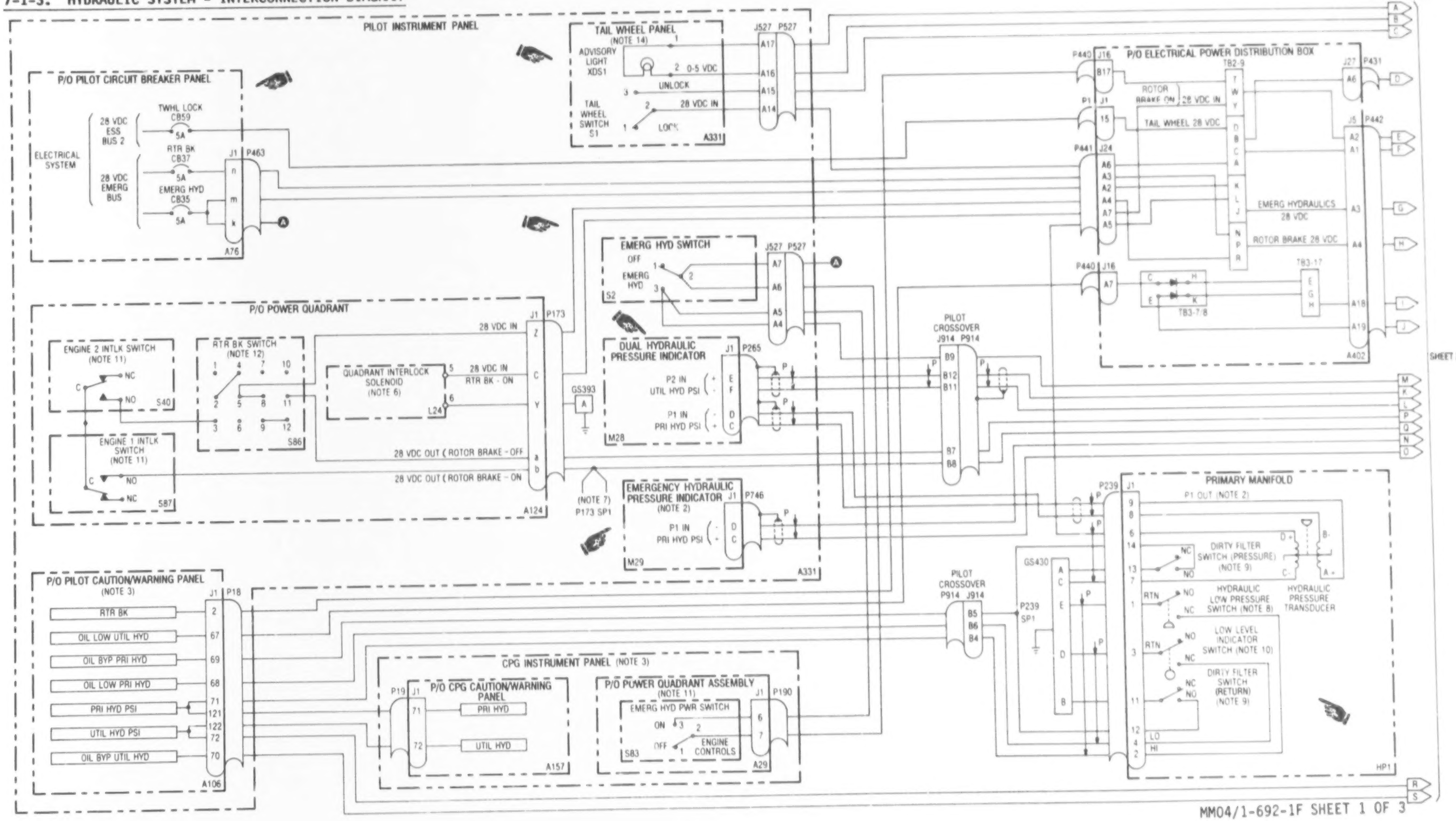
Symptom	Go to Para
C. Pressurized Air System - Operational Check:	
1. **SHAFT DRIVEN COMP** indicator - is not lighted during APU start cycle.	7-4-1
2. **SHAFT DRIVEN COMP** indicator - remains lighted after APU start cycle.	7-4-1
3. ECS airflow does not decrease with FUEL BST circuit breaker open and No. 1 engine operating.	7-4-1
4. Fuel does not transfer - with No. 1 engine bleed air supplying PAS manifold.	7-4-1
5. **FUEL BST** circuit breaker - does not stay closed.	7-4-1

7-1-2. HYDRAULIC SYSTEM DIAGRAM


HYDRAULIC SYSTEM
PAS AIR IN
THERMAL BYPASS VLV
IN
OUT
PRIMARY HEAT EXCHANGER
3 LEFT OUTBOARD
3 LEFT INBOARD
2
1
DIRECTIONAL SERVOACTUATOR
YAW RIGHT
YAW LEFT
ROTOR BRAKE ACTUATOR
PAS MANIFOLD
CASE DRAIN
CHECK VALVE
NORM
REFILL
BLEED VALVE
PRESS FILTER 15-MICRON
RTN FILTER 15-MICRON
AIR
TAIL WHEEL LOCK ACTUATOR
LOCK
BRAKE
OFF
ROTOR BRAKE PRESSURE SWITCH
PRIMARY PUMP
RTN
PRESS
CHECK VALVE
DIRTY FILTER INDICATORS
TURRET
AREA WEAPON QUICK DISCONNECT
PITCH UP
PITCH DOWN
LONGITUDINAL SERVO
CONTROL VALVE
CHECK VALVE
PRESS FILTER 15-MICRON
RTN FILTER 15-MICRON
ROTOR BRAKE SOLENOIDS
PRESS SW
PUMP SCT
SEAL DRAIN
OVBD
AIR
AIR PRESS RELIEF VLV CRACK PRESS 75 PSI
ROTOR BRAKE
OFF
ON
OVBD
DIRTY FILTER INDICATORS
UTILITY MANIFOLD
LOW LVL SWITCH
LOW LVL VALVE
PUMP PRESS
SEAL DRAIN
OVBD
CHECK VALVE
PRESS SW
LOW LVL SW
PRESS TRANSDUCER
GSE
RTN GSE
RTN
INCR LIFT
DECR LIFT
COLLECTIVE SERVO
TAIL WHEEL LOCK CONTROL VALVE
FROM LOCK SWITCH
CHECK VALVE
NORM
REFILL
BLEED VALVE
PRESS TRANSDUCER
EMERGENCY HYD PRESS TRANSDUCER
START RTN
PRESS GSE
RTN GSE
ACC PRESS
RTN
AIR PRESS
CONT PRESS
OVFL
UTILITY PUMP
PRESS
RTN
CASE DRAIN
PUMP PRESS
PRIMARY MANIFOLD
OVBD
PRESS
PUMP SCT
ROLL LEFT
ROLL RIGHT
LATERAL SERVO
AZIMUTH DRIVE MOTOR
ELEVATION DRIVE SERVO
STOW SPRING
SHUTOFF VALVE
FROM LOW LVL SWITCH
CHECK VALVE
THERMAL BYPASS VLV
OUT
IN
UTILITY HEAT EXCHANGER
PAS AIR IN
CHECK VALVE
RETURN ACCUMULATOR
55 PSI
PIVOT
AREA WEAPON
3 POSITION SELECTOR VALVE
UTIL ACC
HAND PUMP
UTIL RES
INBD
AFT
PRI RES
OUTBD
FILL
HANDLE
OPERATE
FILTER
RTN
PRESS
APU START MOTOR
RESTRICTOR
UTILITY ACCUMULATOR
FROM APU START SW
START SOLENOID
CARRIER DRIVE MOTOR
CARRIER DRIVE ASSEMBLY
PRIMARY
RETURN
PRESSURE
FLUID FILL
UTILITY
PRESSURE
RETURN
1650 PSI
GAS RESERVOIR
2
3 RIGHT OUTBOARD
3 RIGHT INBOARD
LEGEND
1 WING QUICK DISCONNECT
2 PYLON QUICK DISCONNECT
3 EXTERNAL STORES SERVOACTUATOR
UTILITY PRESSURE 3000 PSI
UTILITY RETURN 30 PSI
PRIMARY PRESSURE 3000 PSI
PRIMARY RETURN 30 PSI
UTILITY CONTROL PRESSURE
ACCUMULATOR PRESSURE
UTILITY PUMP SUCTION
AIR PRESSURE
NITROGEN PRESSURE PRECHARGED
DRAIN BLEED
ELECTRICAL CONNECTOR
UTILITY PUMP SUCTION
APU PRESS

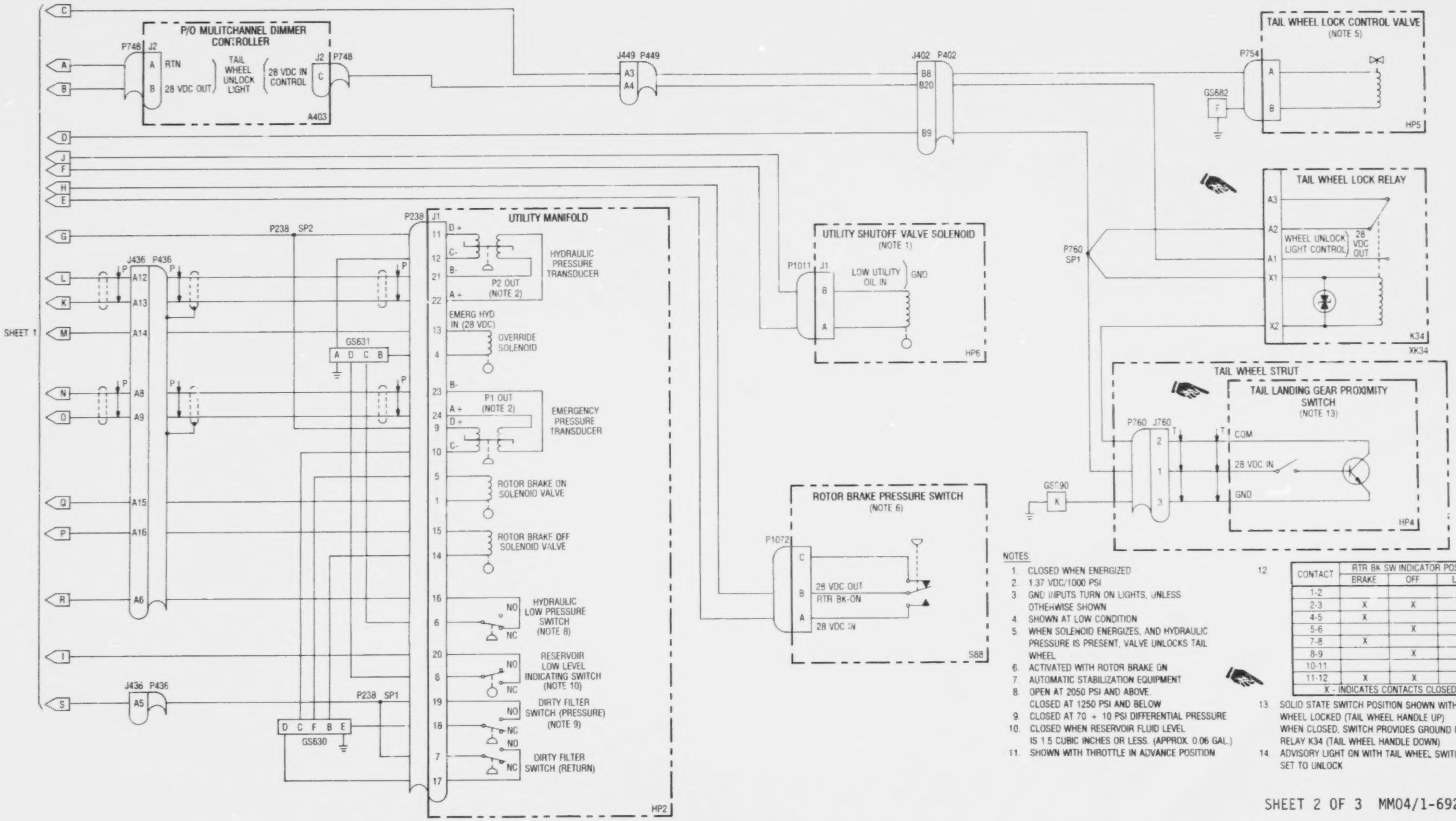
MM04/1-710A

7-1-3. HYDRAULIC SYSTEM - INTERCONNECTION DIAGRAM


PILOT INSTRUMENT PANEL
P/O PILOT CIRCUIT BREAKER PANEL
ELECTRICAL SYSTEM
28 VDC ESS BUS 2
28 VDC EMERG BUS
TWHL LOCK CB59 5A
RTR BK CB37 5A
EMERG HYD CB35 5A
J1 P463
A76
TAIL WHEEL PANEL (NOTE 14)
ADVISORY LIGHT XDS1
0-5 VDC
UNLOCK
TAIL WHEEL SWITCH S1
28 VDC IN
LOCK
A331
J527 P527
A17 A16 A15 A14
EMERG HYD SWITCH
OFF
EMERG HYD
S2
A7 A6 A5 A4
P/O POWER QUADRANT
ENGINE 2 INTLK SWITCH (NOTE 11)
S40
ENGINE 1 INTLK SWITCH (NOTE 11)
S87
RTR BK SWITCH (NOTE 12)
S86
QUADRANT INTERLOCK SOLENOID (NOTE 6)
L24
28 VDC IN
RTR BK - ON
28 VDC OUT (ROTOR BRAKE - OFF
28 VDC OUT (ROTOR BRAKE - ON
J1 P173
A124
GS393
(NOTE 7) P173 SP1
DUAL HYDRAULIC PRESSURE INDICATOR
J1 P265
P2 IN UTIL HYD PSI
P1 IN PRI HYD PSI
M28
EMERGENCY HYDRAULIC PRESSURE INDICATOR (NOTE 2)
J1 P746
P1 IN PRI HYD PSI
M29
A331
PILOT CROSSOVER J914 P914
B9 B12 B11 B7 B8
P/O PILOT CAUTION/WARNING PANEL (NOTE 3)
J1 P18
RTR BK
OIL LOW UTIL HYD
OIL BYP PRI HYD
OIL LOW PRI HYD
PRI HYD PSI
UTIL HYD PSI
OIL BYP UTIL HYD
A106
CPG INSTRUMENT PANEL (NOTE 3)
P/O CPG CAUTION/WARNING PANEL
P19 J1
PRI HYD
UTIL HYD
A157
P/O POWER QUADRANT ASSEMBLY (NOTE 11)
EMERG HYD PWR SWITCH
ON
OFF
ENGINE CONTROLS
S83
J1 P190
A29
PILOT CROSSOVER P914 J914
B5 B6 B4
P239 SP1
GS430
P/O ELECTRICAL POWER DISTRIBUTION BOX
P440 J16
B17
P1 J1
P441 J24
TB2-9
ROTOR BRAKE ON
28 VDC IN
TAIL WHEEL 28 VDC
EMERG HYDRAULICS 28 VDC
ROTOR BRAKE 28 VDC
TB3-17
TB3-7/8
J27 P431
J5 P442
A402
SHEET 2
PRIMARY MANIFOLD
P239 J1
P1 OUT (NOTE 2)
DIRTY FILTER SWITCH (PRESSURE) (NOTE 9)
HYDRAULIC PRESSURE TRANSDUCER
HYDRAULIC LOW PRESSURE SWITCH (NOTE 8)
LOW LEVEL INDICATOR SWITCH (NOTE 10)
DIRTY FILTER SWITCH (RETURN) (NOTE 9)
RTN
NC
NO
LO
HI
HP1
A B C D E F G H I J M K L P Q N O R S

MM04/1-692-1F SHEET 1 OF 3

7-1-3. HYDRAULIC SYSTEM - INTERCONNECTION DIAGRAM (cont)


C
A
B
D
J
F
H
E
G
L
K
SHEET 1
M
N
O
Q
P
R
I
S
P/O MULITCHANNEL DIMMER CONTROLLER
P748
J2
RTN
28 VDC OUT
TAIL WHEEL UNLOCK LIGHT
28 VDC IN CONTROL
A403
J449 P449
A3
A4
J402 P402
B8
B20
B9
TAIL WHEEL LOCK CONTROL VALVE
(NOTE 5)
P754
GS682
HP5
TAIL WHEEL LOCK RELAY
A3
A2
A1
X1
X2
WHEEL UNLOCK LIGHT CONTROL
28 VDC OUT
K34
XK34
P760 SP1
UTILITY SHUTOFF VALVE SOLENOID
(NOTE 1)
P1011
J1
LOW UTILITY OIL IN
GND
HP6
TAIL WHEEL STRUT
TAIL LANDING GEAR PROXIMITY SWITCH
(NOTE 13)
P760 J760
COM
28 VDC IN
GND
GS690
HP4
ROTOR BRAKE PRESSURE SWITCH
(NOTE 6)
P1072
28 VDC OUT
RTR BK-ON
28 VDC IN
S88
P238 SP2
J436 P436
A12
A13
A14
A8
A9
A15
A16
A6
A5
GS631
GS630
P238 SP1
P238 J1
UTILITY MANIFOLD
HYDRAULIC PRESSURE TRANSDUCER
P2 OUT (NOTE 2)
EMERG HYD IN (28 VDC)
OVERRIDE SOLENOID
P1 OUT (NOTE 2)
EMERGENCY PRESSURE TRANSDUCER
ROTOR BRAKE ON SOLENOID VALVE
ROTOR BRAKE OFF SOLENOID VALVE
HYDRAULIC LOW PRESSURE SWITCH (NOTE 8)
RESERVOIR LOW LEVEL INDICATING SWITCH (NOTE 10)
DIRTY FILTER SWITCH (PRESSURE) (NOTE 9)
DIRTY FILTER SWITCH (RETURN)
NO
NC
HP2

NOTES:

1. CLOSED WHEN ENERGIZED
2. 1.37 VDC/1000 PSI
3. GND INPUTS TURN ON LIGHTS, UNLESS OTHERWISE SHOWN
4. SHOWN AT LOW CONDITION
5. WHEN SOLENOID ENERGIZES, AND HYDRAULIC PRESSURE IS PRESENT, VALVE UNLOCKS TAIL WHEEL
6. ACTIVATED WITH ROTOR BRAKE ON
7. AUTOMATIC STABILIZATION EQUIPMENT
8. OPEN AT 2050 PSI AND ABOVE. CLOSED AT 1250 PSI AND BELOW
9. CLOSED AT 70 + 10 PSI DIFFERENTIAL PRESSURE
10. CLOSED WHEN RESERVOIR FLUID LEVEL IS 1.5 CUBIC INCHES OR LESS. (APPROX. 0.06 GAL.)
11. SHOWN WITH THROTTLE IN ADVANCE POSITION
12.

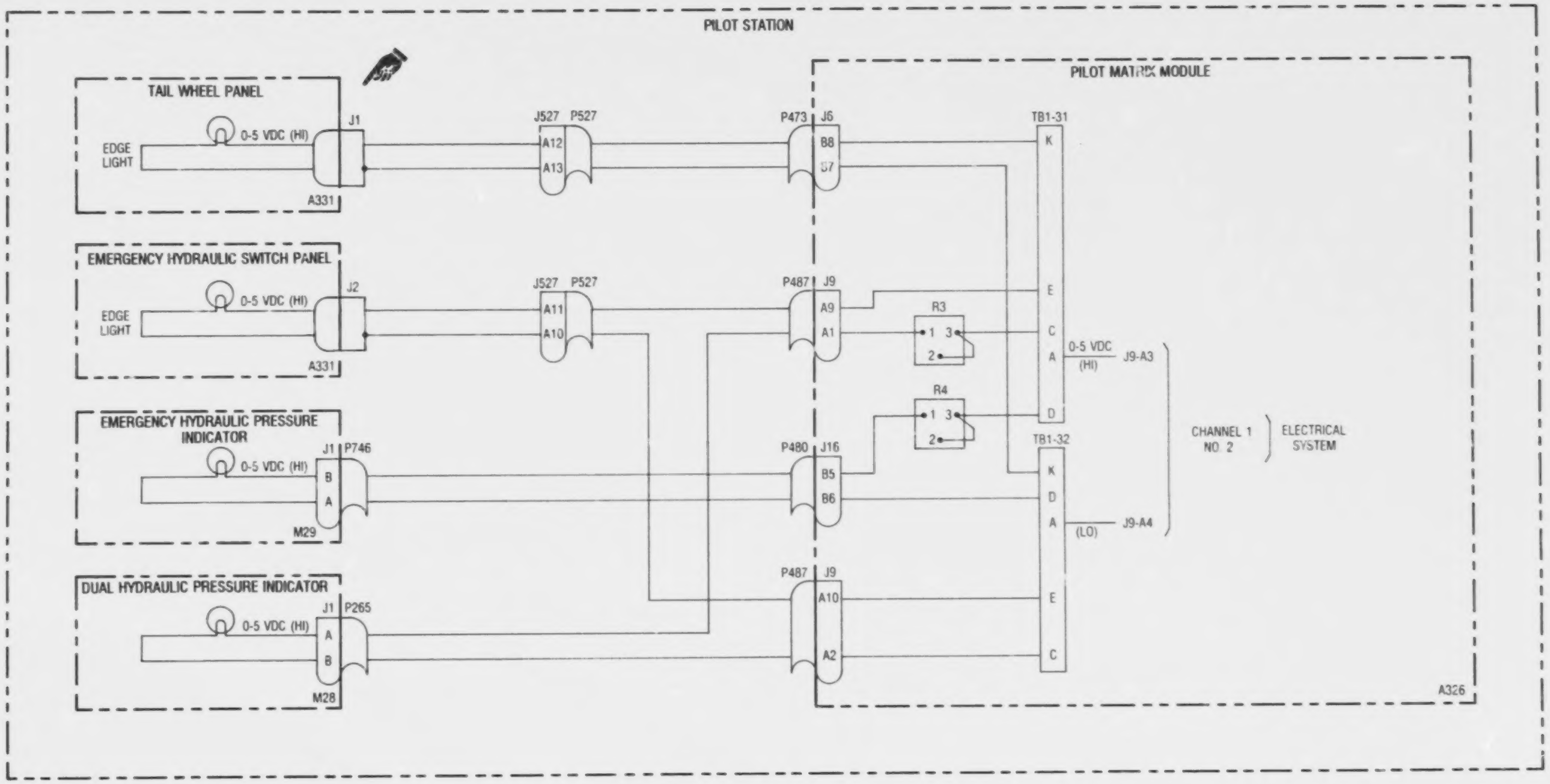
CONTACT	RTR BK SW INDICATOR POSITION		
	BRAKE	OFF	LOCK
1-2			X
2-3	X	X	
4-5	X		X
5-6		X	
7-8	X		X
8-9		X	
10-11			X
11-12	X	X	
X - INDICATES CONTACTS CLOSED			

13. SOLID STATE SWITCH POSITION SHOWN WITH TAIL WHEEL LOCKED (TAIL WHEEL HANDLE UP) WHEN CLOSED, SWITCH PROVIDES GROUND FOR RELAY K34 (TAIL WHEEL HANDLE DOWN)
14. ADVISORY LIGHT ON WITH TAIL WHEEL SWITCH SET TO UNLOCK

SHEET 2 OF 3 MM04/1-692-2F

best copy available

7-1-3. HYDRAULIC SYSTEM - INTERCONNECTION DIAGRAM (cont)


PILOT STATION
PILOT MATRIX MODULE
TAIL WHEEL PANEL
EDGE LIGHT
0-5 VDC (HI)
J1
A331
J527
P527
A12
A13
P473
J6
B8
B7
TB1-31
K
EMERGENCY HYDRAULIC SWITCH PANEL
EDGE LIGHT
0-5 VDC (HI)
J2
A331
J527
P527
A11
A10
P487
J9
A9
A1
E
R3
1
3
2
C
A
0-5 VDC
(HI)
J9-A3
R4
1
3
2
D
EMERGENCY HYDRAULIC PRESSURE INDICATOR
0-5 VDC (HI)
J1
P746
B
A
M29
P480
J16
B5
B6
TB1-32
K
D
A
(LO)
J9-A4
CHANNEL 1
NO. 2
ELECTRICAL SYSTEM
DUAL HYDRAULIC PRESSURE INDICATOR
0-5 VDC (HI)
J1
P265
A
B
M28
P487
J9
A10
A2
E
C
A326

MM04/1-692-3C SHEET 3 OF 3

7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Caliper, Inside	5210-00-2229-3060

Personnel Required:

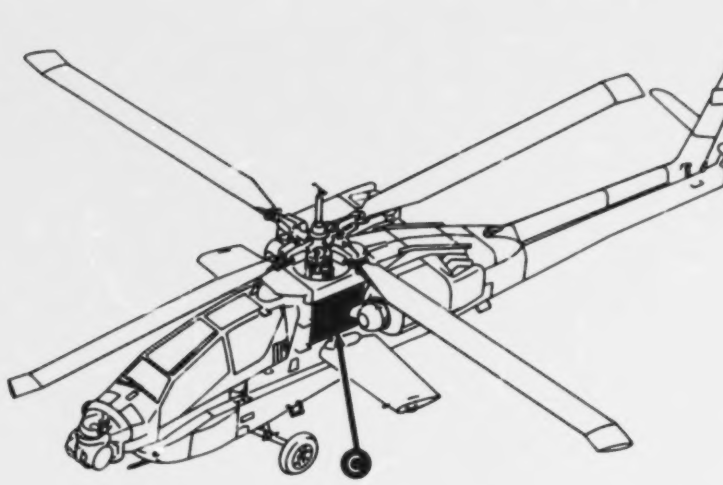
67R10 Attack Helicopter Repairer
One person to assist

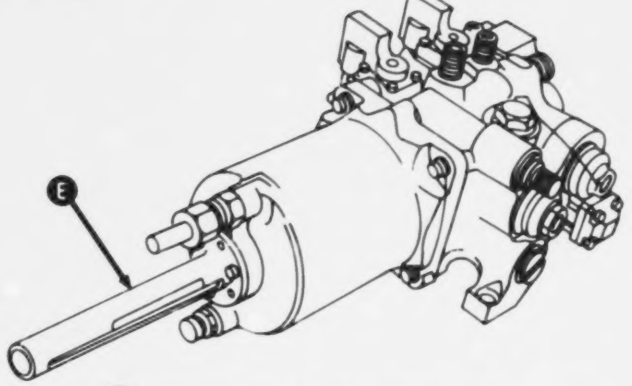
References:

TM 55-1520-238-23
TM 55-1520-238-PMS

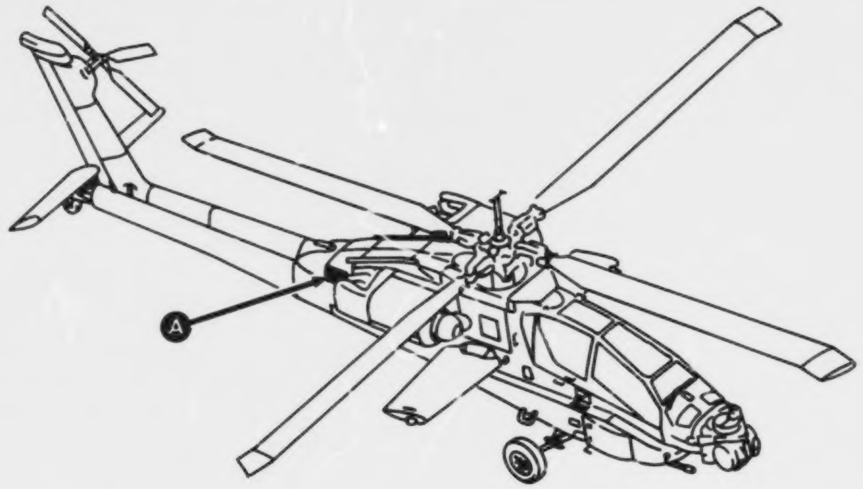
Equipment Conditions:

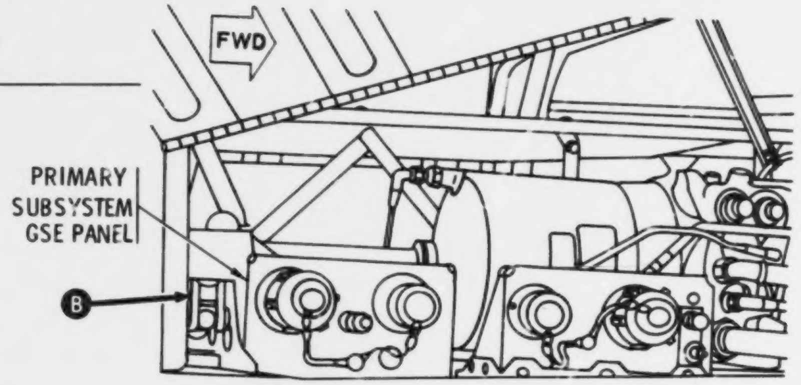
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (primary) - Pressurized air
Para 1-3-2	ICS connected



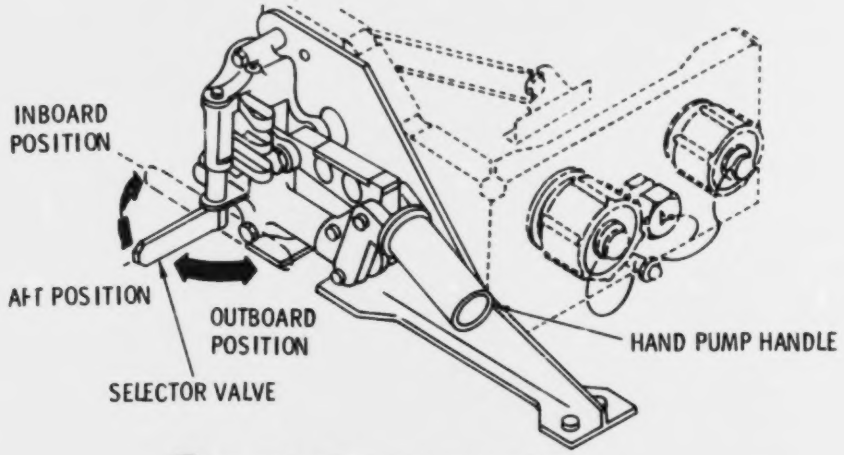


D PRIMARY HYDRAULIC MANIFOLD

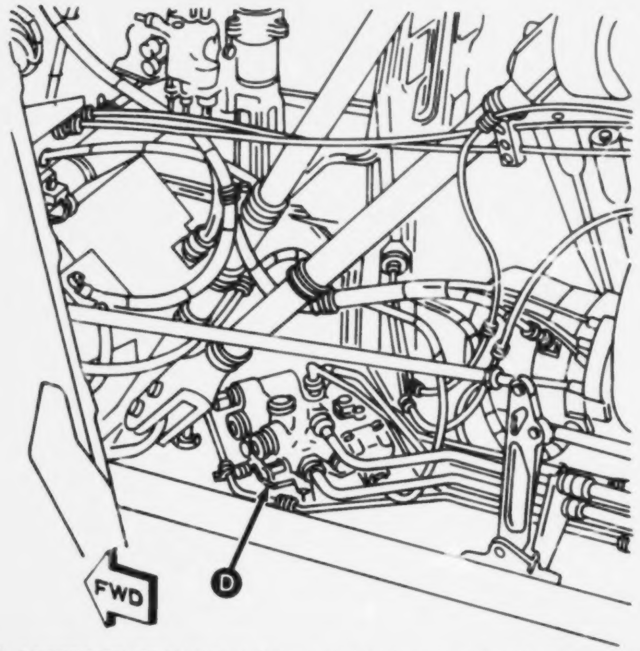



FWD
PRIMARY SUBSYSTEM GSE PANEL
B

A ACCESS TO GSE PANELS THRU R325


INBOARD POSITION
AFT POSITION
OUTBOARD POSITION
SELECTOR VALVE
HAND PUMP HANDLE

B PRIMARY HYDRAULIC HAND PUMP



C ACCESS TO PRIMARY HYDRAULIC MANIFOLD THRU PANEL L200

MM04/1-701-1B

GO TO NEXT PAGE

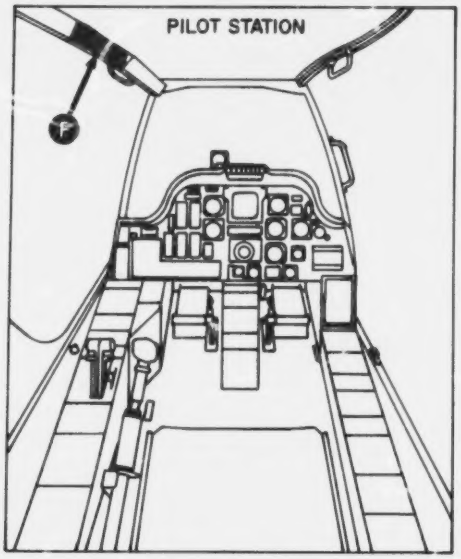
7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

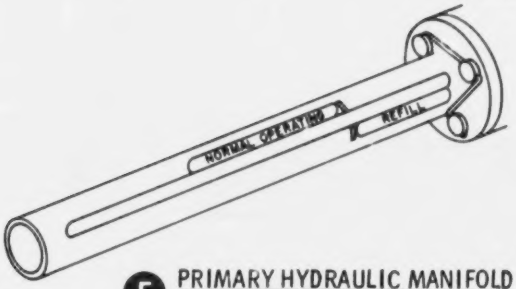
A. Perform visual check of primary hydraulic system with GPU operating (TM 55-1520-238-PMS). Replace any leaking component (TM 55-1520-238-23).

B. If rotors begin to turn when primary hydraulic external power is applied, replace primary hydraulic pump outlet check valve (TM 55-1520-238-23).

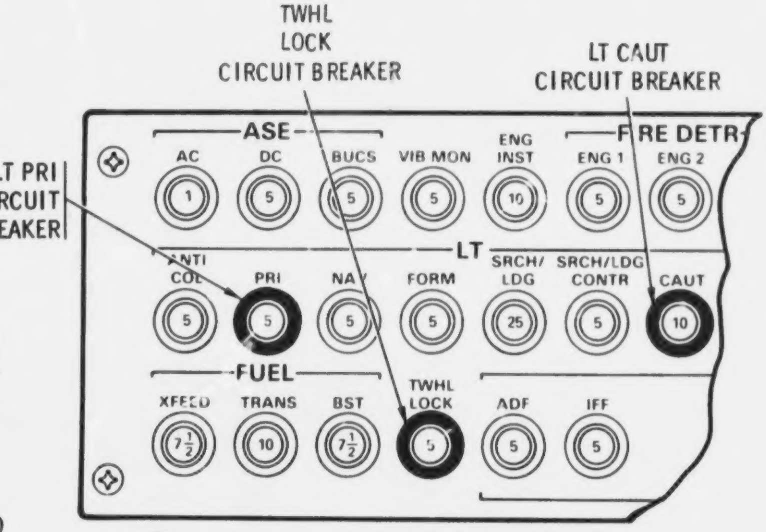
C. Remove external pressurized air and hydraulic (primary) power (TM 55-1520-238-23).

D. Do not close access doors or install access panels until operational check is completed.


PILOT STATION
F


NORMAL OPERATING
REFILL

E PRIMARY HYDRAULIC MANIFOLD FLUID LEVEL INDICATOR


TWHL LOCK CIRCUIT BREAKER
LT CAUT CIRCUIT BREAKER
LT PRI CIRCUIT BREAKER
ASE
AC
DC
BUCS
VIB MON
ENG INST
FIRE DETR
ENG 1
ENG 2
1
5
5
5
10
5
5
LT
ANTI COL
PRI
NAV
FORM
SRCH/ LDG
SRCH/LDG CONTR
CAUT
5
5
5
5
25
5
10
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
IFF
7½
10
7½
5
5
5

F PILOT CENTER CIRCUIT BREAKER PANEL

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WARNING

The hydraulic system is pressurized to 3000 PSI. Be certain that trapped hydraulic pressure is released before loosening any connections. Failure to do so could result in death or serious injury. If injury occurs, get medical aid immediately.

NOTE

Total primary system fluid volume is 0.75 gallon.

E. Drain primary reservoir to REFILL level if required (TM 55-1520-238-23).

NOTE

Decal on access door R325 shows proper positioning of selector valve of hydraulic hand pump.

F. Set hydraulic hand pump selector valve to **INBOARD**.

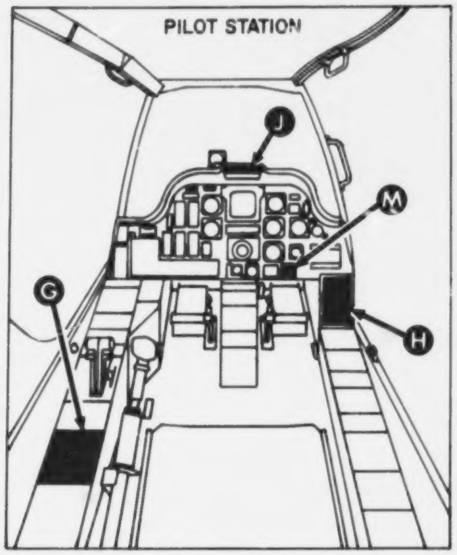
G. On pilot center circuit breaker panel, close the **LT PRI**, **LT CAUT**, and **TWHL LOCK** circuit breakers.

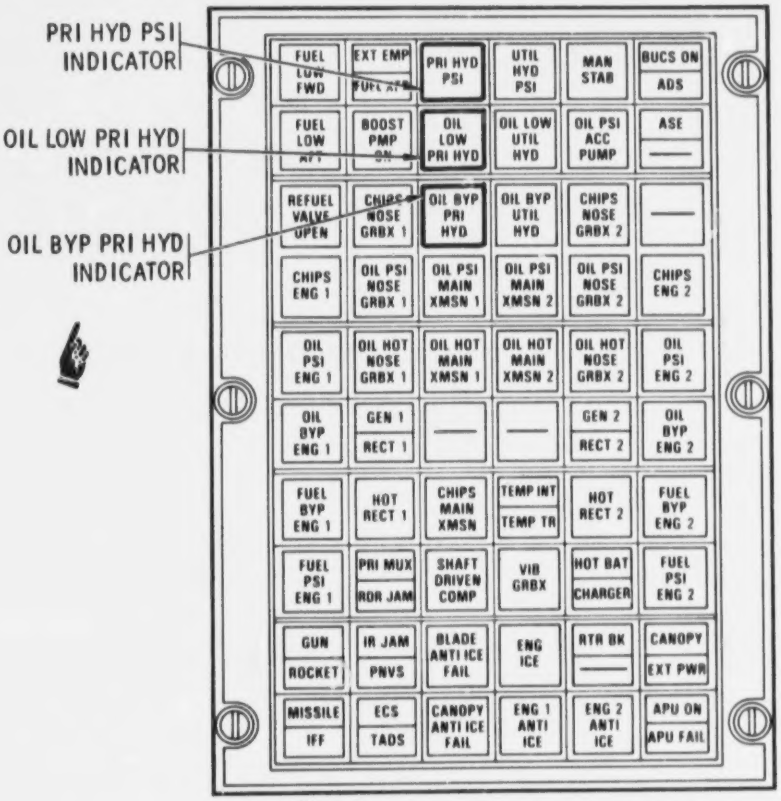
H. Complete operational check as follows:

TASK	RESULT
NOTE Removable handle for hydraulic hand pump is stowed in cross beam of access door R325.	
1. Using hydraulic hand pump handle, service primary hydraulic manifold reservoir to normal operating level (TM 55-1520-238-23).	If hydraulic hand pump does not service primary hydraulic manifold reservoir, go to para 7-2-4.
2. Set hydraulic hand pump selector valve to **AFT**.	

GO TO NEXT PAGE

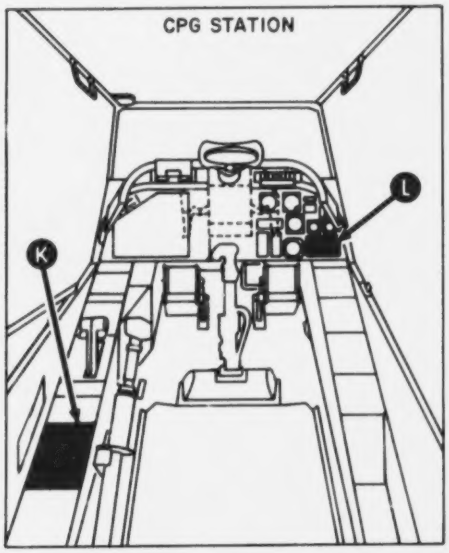
7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

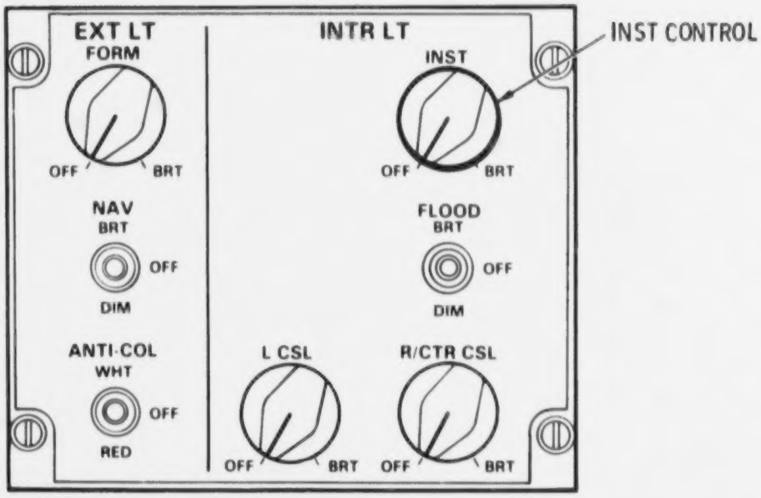

PILOT STATION
J
M
G
H


PRI HYD PSI INDICATOR
OIL LOW PRI HYD INDICATOR
OIL BYP PRI HYD INDICATOR

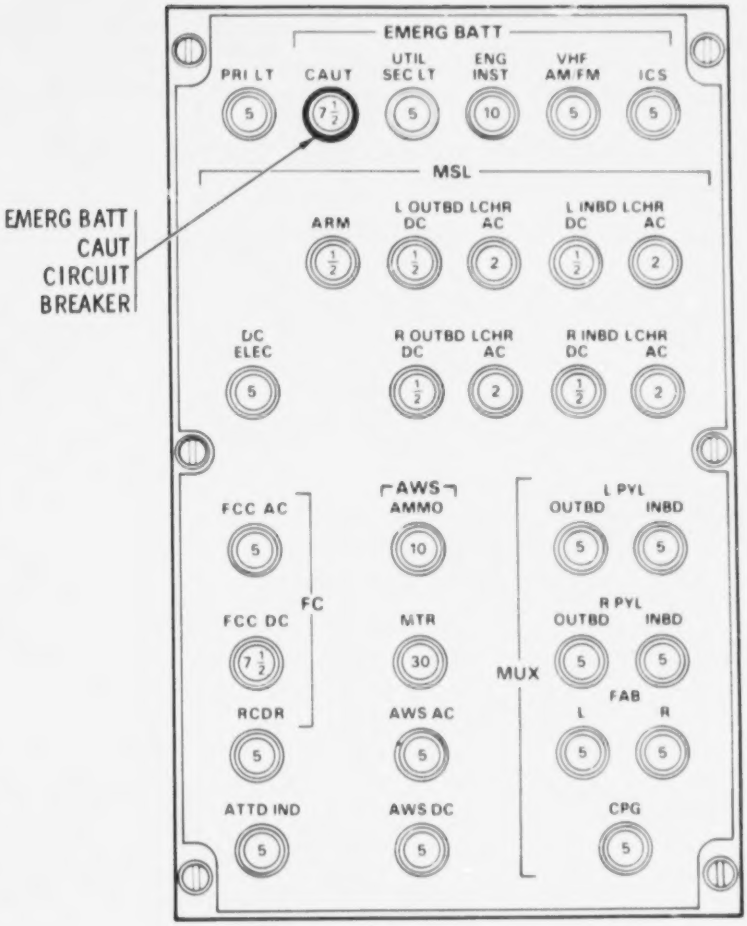
FUEL LOW FWD	EXT EMP FUEL XFR	PRI HYD PSI	UTIL HYD PSI	MAN STAB	BUCS ON ADS
FUEL LOW AFT	BOOST PMP ON	OIL LOW PRI HYD	OIL LOW UTIL HYD	OIL PSI ACC PUMP	ASE ——
REFUEL VALVE OPEN	CHIPS NOSE GRBX 1	OIL BYP PRI HYD	OIL BYP UTIL HYD	CHIPS NOSE GRBX 2	——
CHIPS ENG 1	OIL PSI NOSE GRBX 1	OIL PSI MAIN XMSN 1	OIL PSI MAIN XMSN 2	OIL PSI NOSE GRBX 2	CHIPS ENG 2
OIL PSI ENG 1	OIL HOT NOSE GRBX 1	OIL HOT MAIN XMSN 1	OIL HOT MAIN XMSN 2	OIL HOT NOSE GRBX 2	OIL PSI ENG 2
OIL BYP ENG 1	GEN 1 RECT 1	——	——	GEN 2 RECT 2	OIL BYP ENG 2
FUEL BYP ENG 1	HOT RECT 1	CHIPS MAIN XMSN	TEMP INT TEMP TR	HOT RECT 2	FUEL BYP ENG 2
FUEL PSI ENG 1	PRI MUX RDR JAM	SHAFT DRIVEN COMP	VIB GRBX	HOT BAT CHARGER	FUEL PSI ENG 2
GUN ROCKET	IR JAM PNVS	BLADE ANTI ICE FAIL	ENG ICE	RTR BK ——	CANOPY EXT PWR
MISSILE IFF	ECS TADS	CANOPY ANTI ICE FAIL	ENG 1 ANTI ICE	ENG 2 ANTI ICE	APU ON APU FAIL

Ⓗ PILOT CAUTION/WARNING PANEL

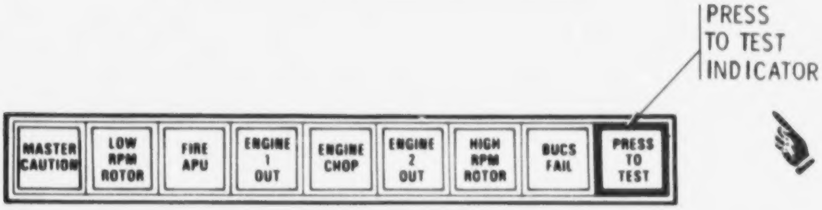

CPG STATION
L
K


EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI-COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
INST CONTROL
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R/CTR CSL
OFF
BRT

Ⓖ PILOT EXT LT/INTR LT PANEL


EMERG BATT
PRI LT
CAUT
UTIL SEC LT
ENG INST
VHF AM/FM
ICS
5
7 1/2
5
10
5
5
MSL
ARM
L OUTBD LCHR
DC
AC
L INBD LCHR
DC
AC
1/2
1/2
2
1/2
2
DC ELEC
5
R OUTBD LCHR
DC
AC
R INBD LCHR
DC
AC
1/2
2
1/2
2
FCC AC
5
FC
FCC DC
7 1/2
RCDR
5
ATTD IND
5
AWS
AMMO
10
MTR
30
AWS AC
5
AWS DC
5
MUX
L PYL
OUTBD
INBD
5
5
R PYL
OUTBD
INBD
5
5
FAB
L
R
5
5
CPG
5
EMERG BATT CAUT CIRCUIT BREAKER

Ⓚ CPG CIRCUIT BREAKER PANEL NO. 1

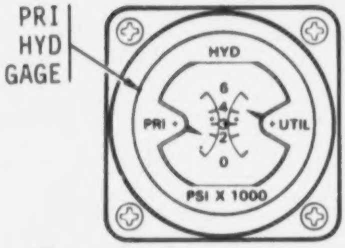

PRESS TO TEST INDICATOR
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

Ⓙ PILOT MASTER CAUTION/WARNING PANEL

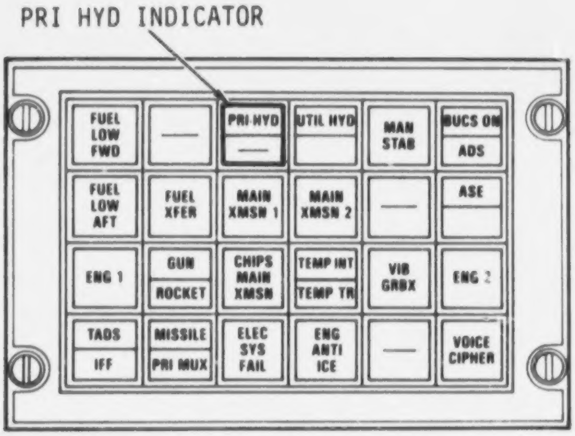
MM04/1-701-3B

GO TO NEXT PAGE

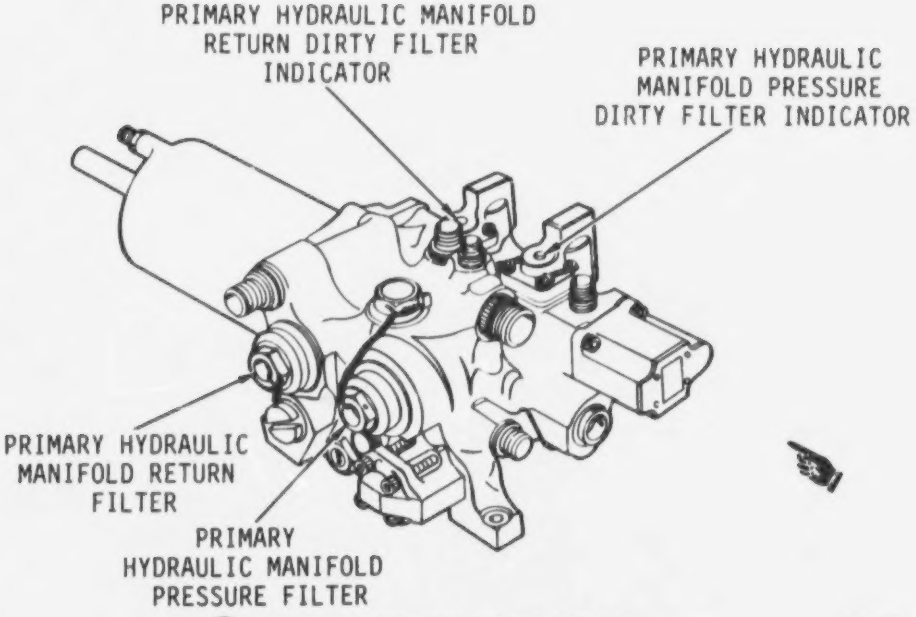
7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)


PRI HYD GAGE
HYD
PRI
UTIL
6
4
2
0
PSI X 1000

Ⓜ PILOT DUAL HYDRAULIC PRESSURE INDICATOR


PRI HYD INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

Ⓛ CPG CAUTION/WARNING PANEL


PRIMARY HYDRAULIC MANIFOLD RETURN DIRTY FILTER INDICATOR
PRIMARY HYDRAULIC MANIFOLD PRESSURE DIRTY FILTER INDICATOR
PRIMARY HYDRAULIC MANIFOLD RETURN FILTER
PRIMARY HYDRAULIC MANIFOLD PRESSURE FILTER

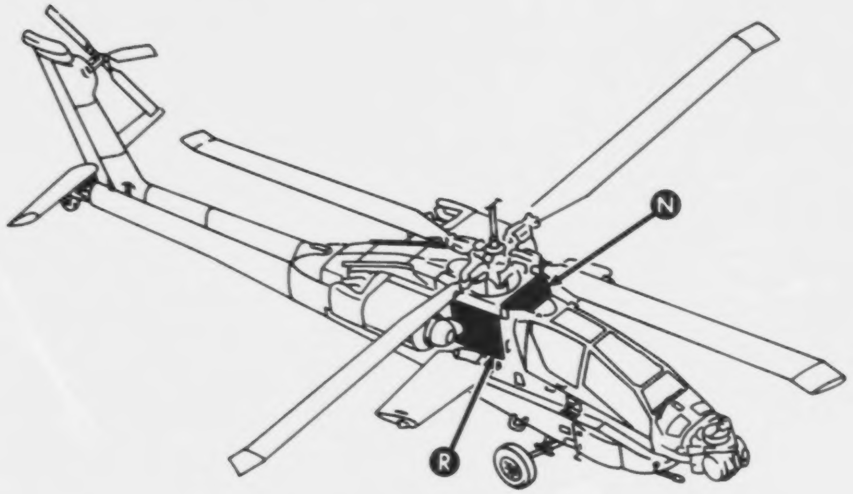
Ⓓ PRIMARY HYDRAULIC MANIFOLD

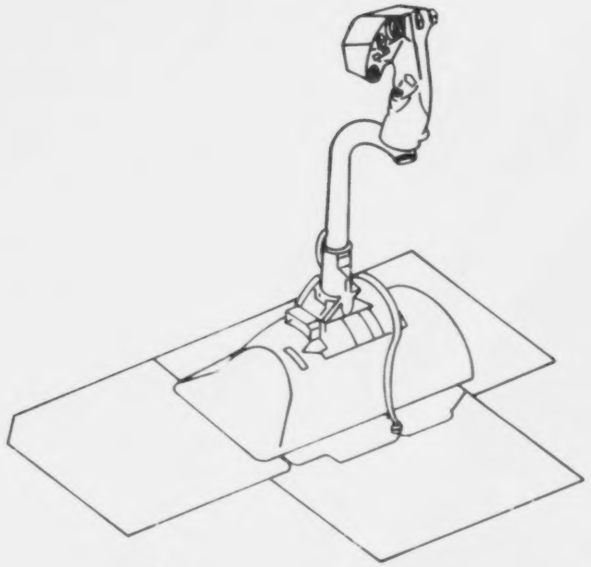
MM04/1-701-4C

TASK	RESULT
3. On pilot master caution/warning panel, depress **PRESS TO TEST** indicator. Check pilot master caution/warning panel and pilot caution/warning panel. All caution/warning indicators are lighted.	If any of the caution/warning indicators are not lighted, refer to chapter 9 to troubleshoot caution/warning system. If **PRI HYD PSI** indicator is not lighted, go to para 7-2-11.
4. Release **PRESS TO TEST** indicator.	
5. Perform external power application - Hydraulic (primary) (TM 55-1520-238-23).	
6. Check **PRI HYD** gage. It indicates **3000 PSI**.	If **PRI HYD** gage does not indicate **3000 PSI**, go to para 7-2-3. If **PRI HYD PSI** indicator is lighted, go to para 7-2-5.
7. On pilot caution/warning panel, check that **PRI HYD PSI**, **OIL LOW PRI HYD**, **OIL BYP PRI HYD** indicators are not lighted.	If **OIL LOW PRI HYD** indicator is lighted, go to para 7-2-6. If **OIL BYP PRI HYD** indicator is lighted, have assistant manually reset primary hydraulic manifold pressure and/or return dirty filter indicator. If indicators are retracted, or if either indicator pops up after manual reset, go to para 7-2-7.
8. On CPG circuit breaker panel No. 1, close **EMERG BATT CAUT** circuit breaker.	If circuit breaker does not stay closed, refer to chapter 9 to troubleshoot CPG caution/warning system.
9. Check **PRI HYD** indicator located on CPG caution/warning panel. Light is not lighted.	If **PRI HYD** indicator is lighted, go to para 7-2-8.
10. On pilot **EXT LT/INTR LT** panel, set **INST** control to **BRT**.	
11. On pilot instrument panel, check dual hydraulic pressure indicator edge-light. Edge-light is lighted.	If dual hydraulic pressure indicator edge-light is not lighted, go to para 7-2-10.

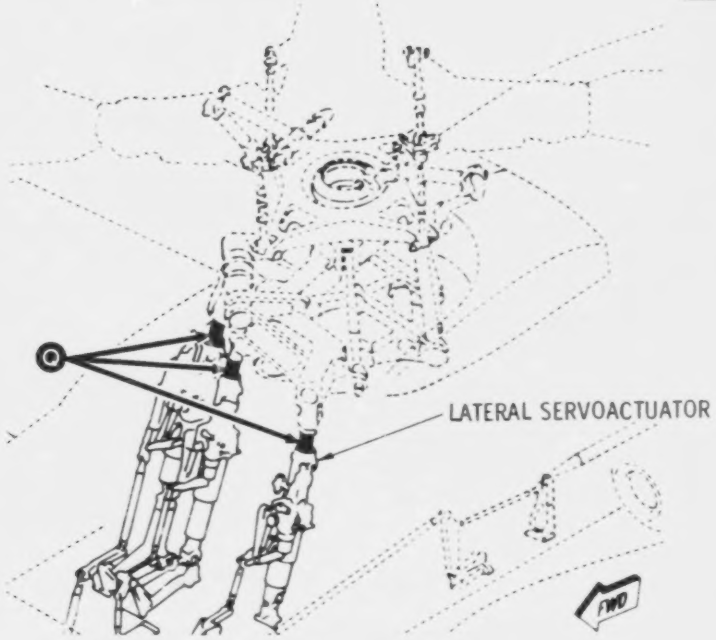
GO TO NEXT PAGE

7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

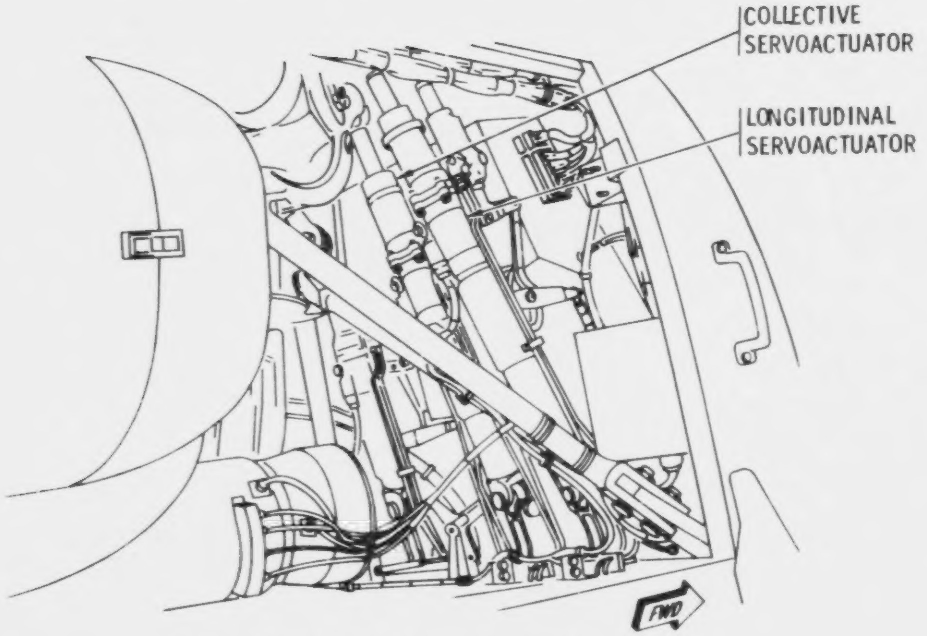




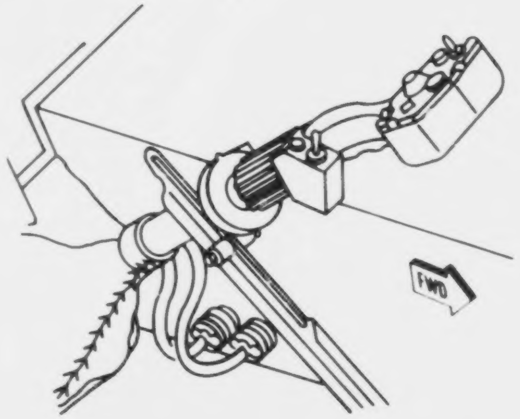
Ⓟ PILOT CYCLIC STICK


Q
LATERAL SERVOACTUATOR
FWD

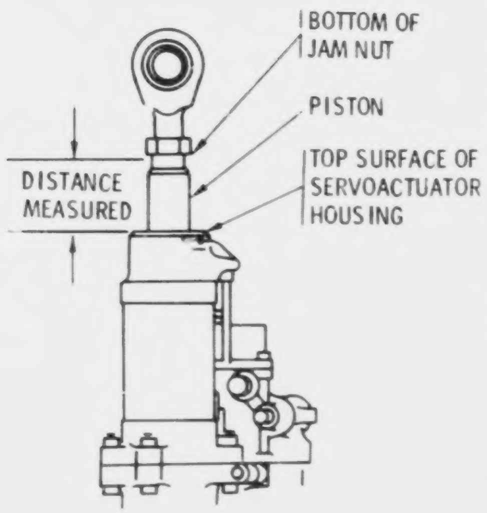
Ⓝ MAIN ROTOR FLIGHT CONTROL SERVOACTUATOR


COLLECTIVE SERVOACTUATOR
LONGITUDINAL SERVOACTUATOR
FWD

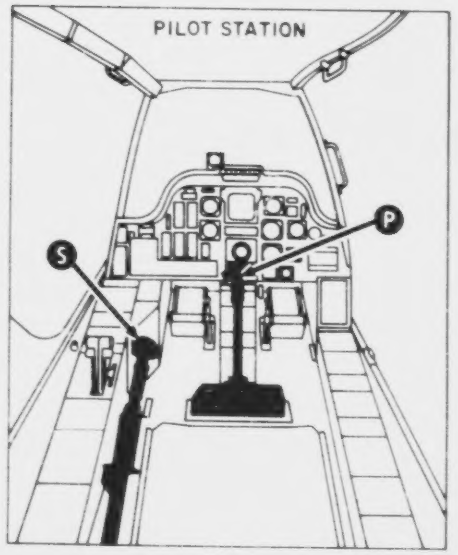
Ⓡ ACCESS TO SERVOACTUATORS THRU PANEL R200



Ⓢ PILOT COLLECTIVE STICK


BOTTOM OF JAM NUT
PISTON
TOP SURFACE OF SERVOACTUATOR HOUSING
DISTANCE MEASURED

Ⓠ SERVOACTUATOR (TYPICAL)


PILOT STATION
S
P

MM04/1-701-5B

GO TO NEXT PAGE

7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

WARNING

Maintenance personnel must be verbally warned prior to moving the collective or cyclic stick. Any activated control can result in sudden blade movement that can sever or crush fingers or hands. If injury occurs, get immediate medical help.

CAUTION

To prevent damage to flight control system components, do not use force if binding or roughness occurs while moving controls with hydraulic power. Prior to continuing the procedure, clear controls of binding. Failure to clear controls of binding may result in sheared pins in the control axis.

NOTE

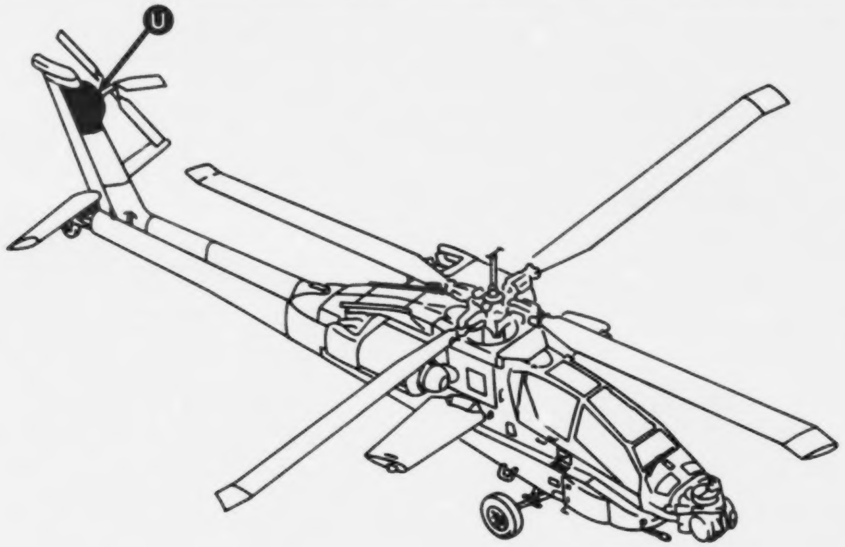
If suspected fault does not apply to flight control system, go to step 39.

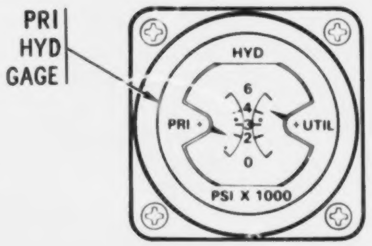
TASK	RESULT
12. Slowly push pilot cyclic stick to full forward position to retract longitudinal servoactuator piston.	
13. Have assistant measure and record actuator stroke. Use inside calipers. Measurement A is from bottom of jam nut to top surface of servoactoator housing (actuator retracted).	
14. Slowly pull pilot cyclic stick to full aft position to extend piston.	
15. Have assistant measure and record actuator stroke. Use inside calipers. Measurement B is from bottom of jam nut to top surface of servoactuator housing (actuator extended).	
16. Subtract measurement A from B. Actuator travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, go to step 32.

TASK	RESULT
17. Slowly pull pilot collective stick to full up position to retract collective servoactuator piston.	
18. Have assistant measure and record actuator stroke. Use inside calipers. Measurement A is from bottom of jam nut to top surface of servoactuator housing (actuator retracted).	
19. Slowly push pilot collective stick to full down position to extend piston.	
20. Have assistant measure and record actuator stroke. Use inside calipers. Measurement B is from bottom of jam nut to top surface of servoactuator housing (actuator extended).	
21. Subtract measurement A from B. Actuator travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, go to step 32.
22. Slowly push pilot cyclic stick to full left position to retract lateral servoactuator piston.	
23. Have assistant measure and record actuator stroke. Use inside calipers. Measurement A is from bottom of jam nut to top surface of servoactuator housing (actuator retracted).	
24. Slowly pull pilot cyclic stick to full right position to extend piston.	
25. Have assistant measure and record actuator stroke with inside calipers. Measurement B is from bottom of the jam nut to top surface of the servoactuator housing (actuator extended).	

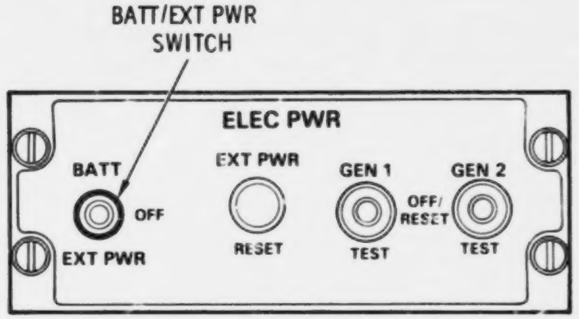
GO TO NEXT PAGE

7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

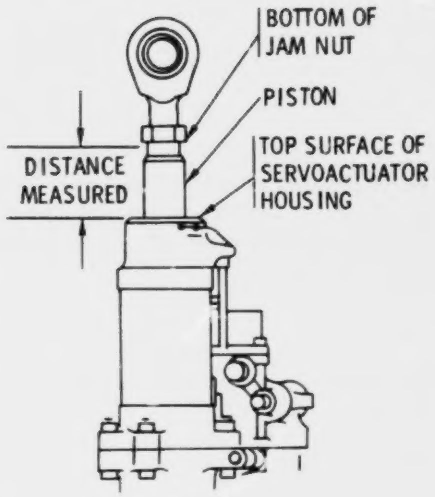



PRI
HYD
GAGE
HYD
6
4
3
2
0
PRI
UTIL
PSI X 1000

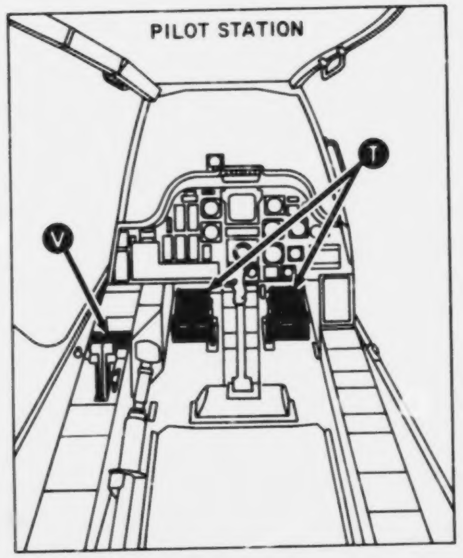
PILOT DUAL HYDRAULIC PRESSURE INDICATOR

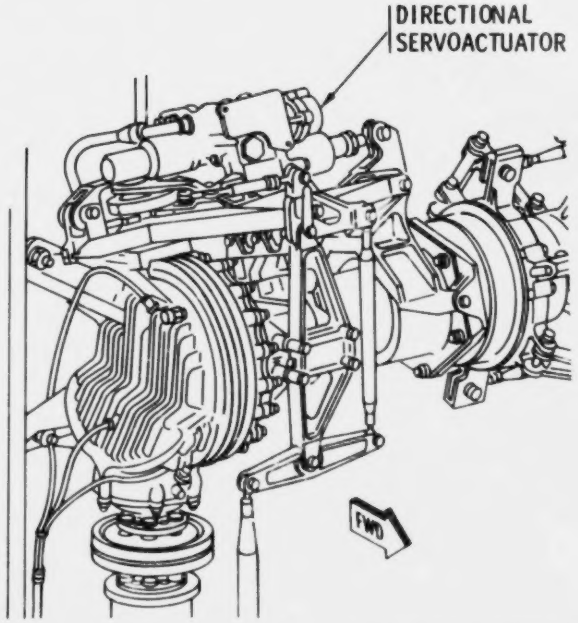

BATT/EXT PWR
SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
OFF/
RESET
TEST
GEN 2
TEST

Ⓥ PILOT ELEC PWR PANEL

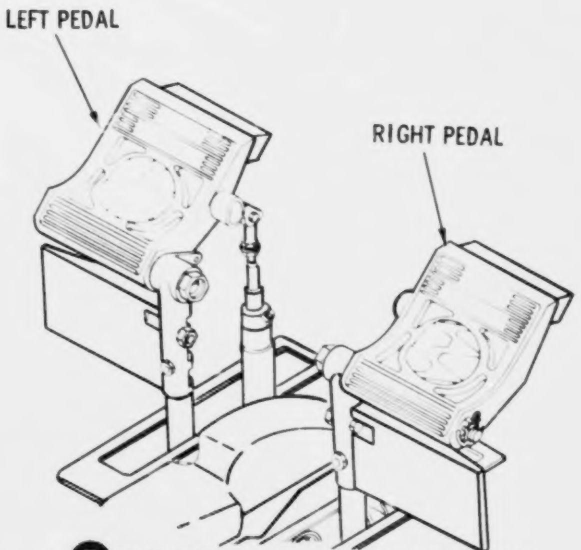

BOTTOM OF
JAM NUT
PISTON
TOP SURFACE OF
SERVOACTUATOR
HOUSING
DISTANCE
MEASURED

SERVOACTUATOR (TYPICAL)


PILOT STATION
V
T


DIRECTIONAL
SERVOACTUATOR
FWD

Ⓤ ACCESS TO DIRECTIONAL SERVOACTUATOR THRU FAIRING L540


LEFT PEDAL
RIGHT PEDAL

Ⓣ DIRECTIONAL CONTROL PEDAL (TYPICAL)

MM04/1-701-6B

GO TO NEXT PAGE

7-2-1. PRIMARY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

TASK	RESULT
26. Subtract measurement A from B. Actuator travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, go to step 32.
27. Slowly push pilot right pedal to full right position to retract directional servoactuator piston.	
28. Have assistant measure and record actuator stroke with inside calipers. Measurement A is from bottom of the jam nut to top surface of the servoactuator housing (actuator retracted).	
29. Slowly push pilot left pedal to full left position to extend piston.	
30. Have assistant measure and record actuator stroke with inside calipers. Measurement B is from bottom of the jam nut to top surface of the servoactuator housing (actuator extended).	
31. Subtract measurement A from B. Actuator travel is 1.750 to 1.810 inches.	If actuator travels full stroke, go to step 39.
32. Check servoactuators for fluid leakage (TM 55-1520-238-23)	If leakage is present, replace leaking servoactuator (TM 55-1520-238-23).
33. Disconnect push-pull rod from servoactuator valve arm (TM 55-1520-238-23).	
34. Slowly push servoactuator valve arm upward to fully retract piston.	
35. Have assistant measure and record actuator stroke with inside calipers. Measurement A is from bottom of the jam nut to top surface of the servoactuator housing (actuator retracted).	

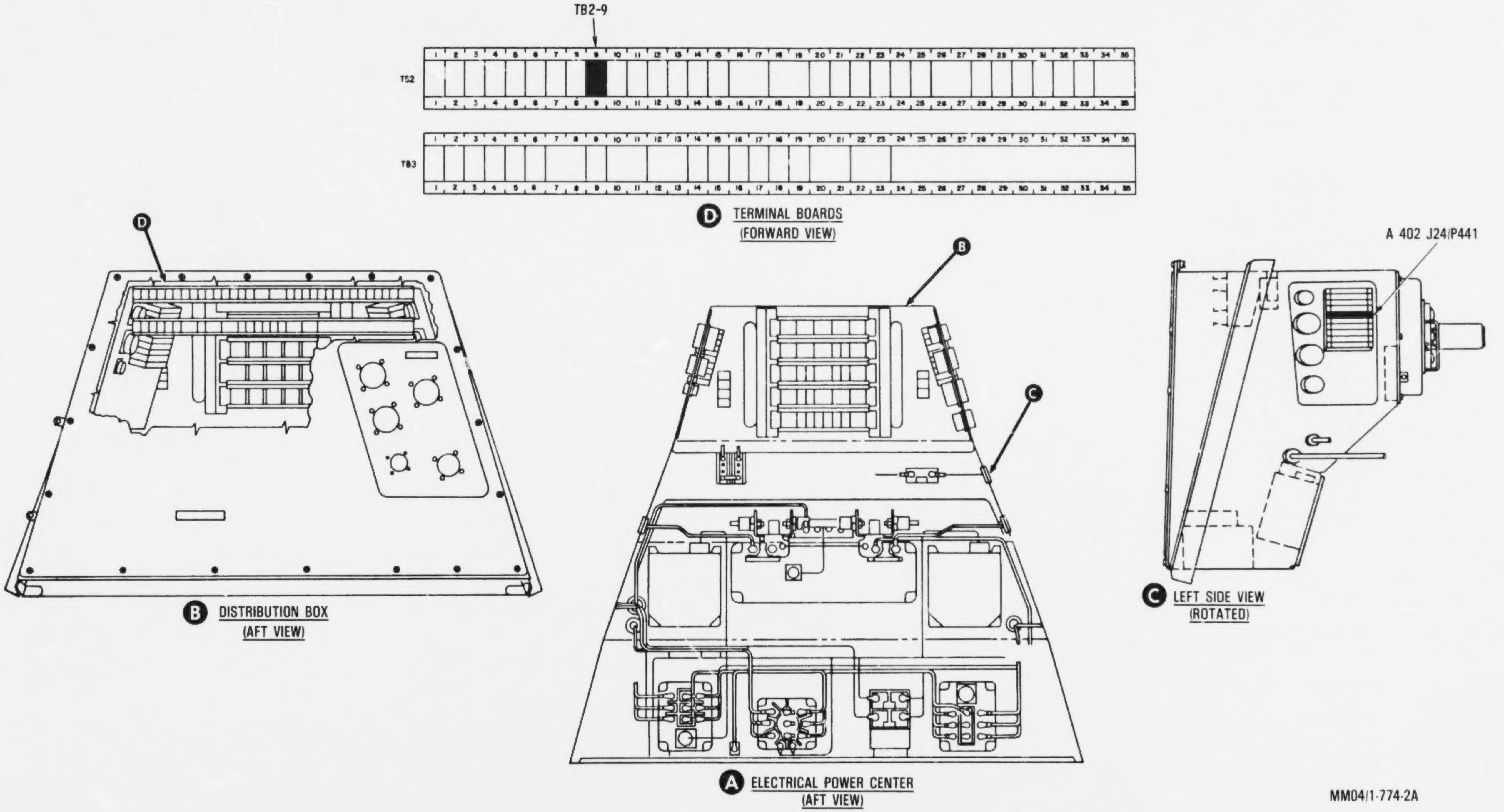
TASK	RESULT
36. Slowly pull servoactuator valve arm downward to fully extend piston.	
37. Have assistant measure and record actuator stroke with inside calipers. Measurement B is from bottom of the jam nut to top surface of the servoactuator housing (actuator extended).	
38. Subtract measurement A from B. Directional actuator travel is 1.750 to 1.810 inches. All other actuators travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, replace servoactuator (TM 55-1520-238-23). If actuator travels full stroke, perform appropriate flight control system rigging check (TM 55-1520-238-23).
39. Disconnect and remove GPU hydraulic pressure from helicopter (TM 55-1520-238-23).	
40. Start helicopter APU (TM 55-1520-238-23).	
41. Check **PRI HYD** gage. It indicates 3000 PSI.	If 3000 PSI is not indicated, go to para 7-2-9.
42. Shutdown APU (TM 55-1520-238-23).	

I. Remove external power - Electrical (TM 55-1520-238-23).

J. Close and secure all access panel and doors opened during this operational check (TM 55-1520-238-23).

END OF TASK

7-2-2. PRIMARY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION


TB2-9
TB2
TB3
D
B
C
A 402 J24/P441

D TERMINAL BOARDS (FORWARD VIEW)

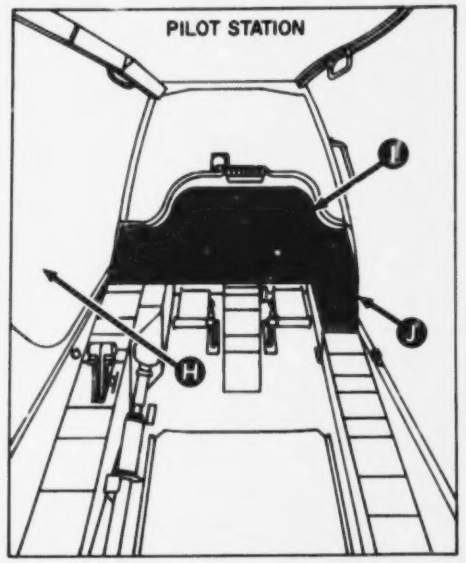
B DISTRIBUTION BOX (AFT VIEW)

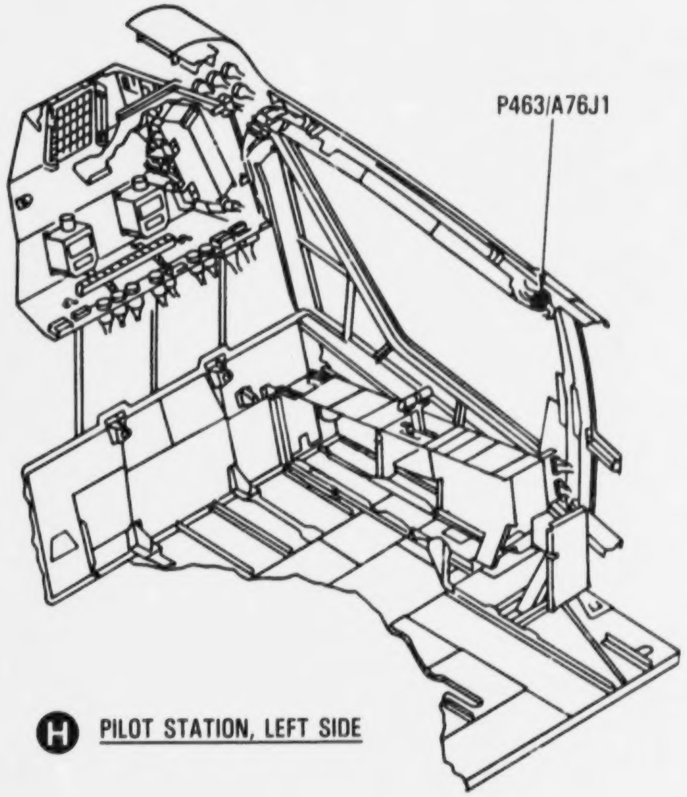
A ELECTRICAL POWER CENTER (AFT VIEW)

C LEFT SIDE VIEW (ROTATED)

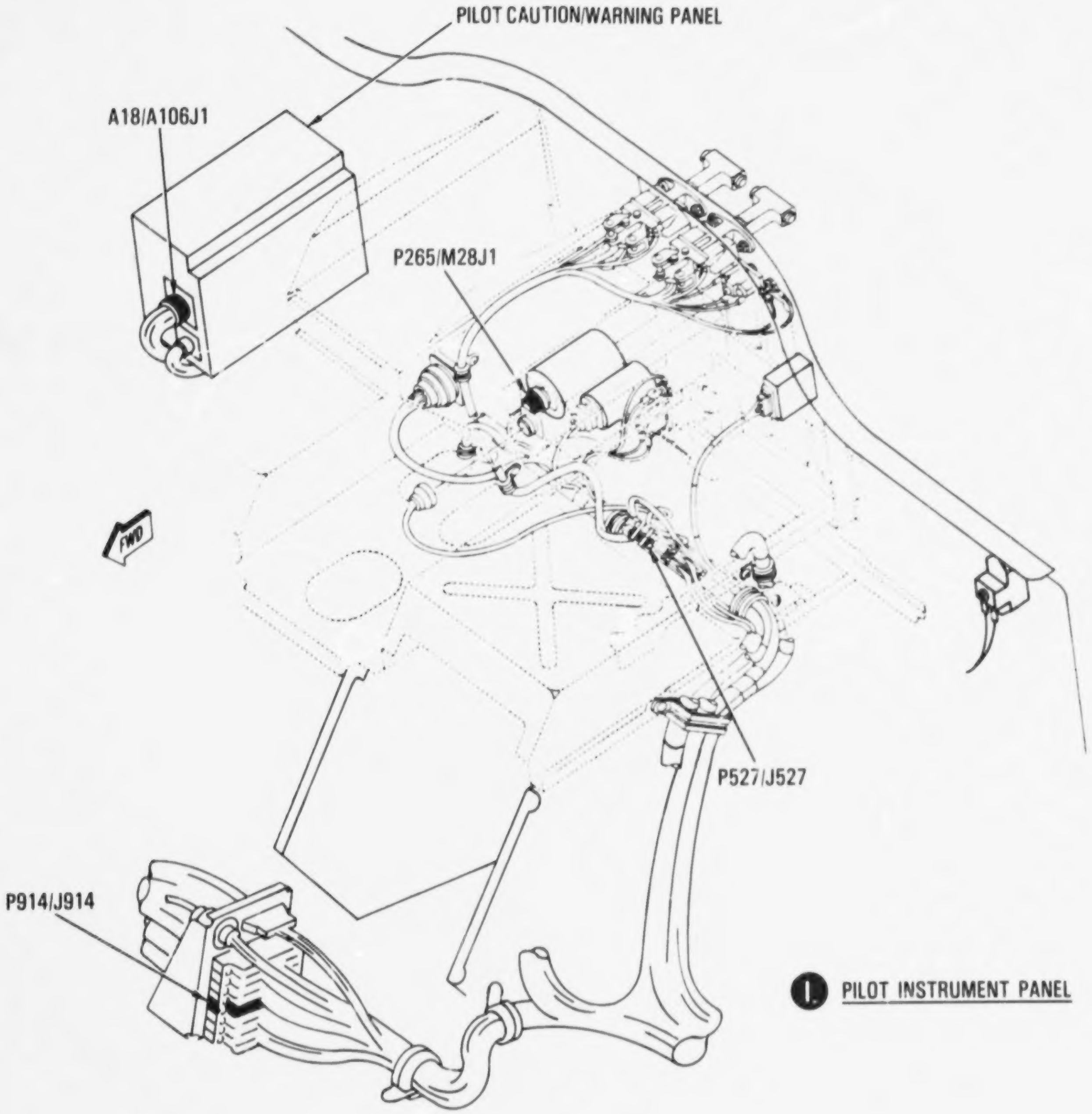
MM04/1-774-2A

7-2-2. PRIMARY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

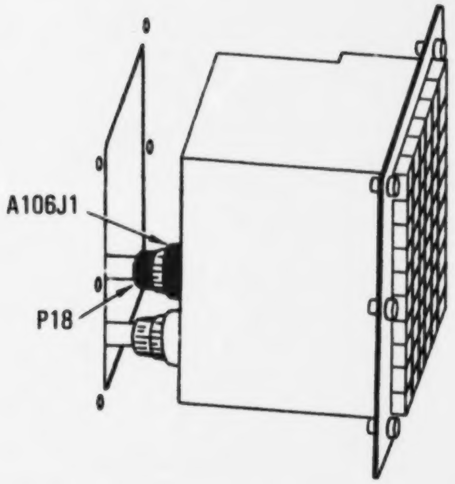

PILOT STATION
I
J
H



Ⓗ PILOT STATION, LEFT SIDE


PILOT CAUTION/WARNING PANEL
A18/A106J1
P265/M28J1
FWD
P527/J527
P914/J914

Ⓘ PILOT INSTRUMENT PANEL



Ⓙ PILOT CAUTION/WARNING PANEL

MM04/1-774-1

7-2-3. PRI HYD GAGE DOES NOT INDICATE 3000 PSI (GPU OPERATION)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/PSM-45	6625-01-139-2512

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

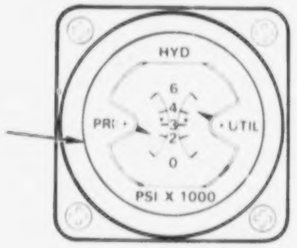
TM 55-1520-238-23

Equipment Conditions:

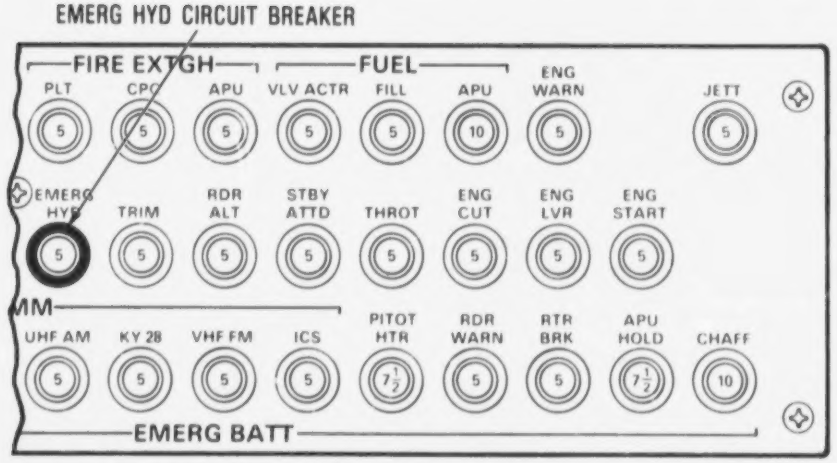
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (primary)
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

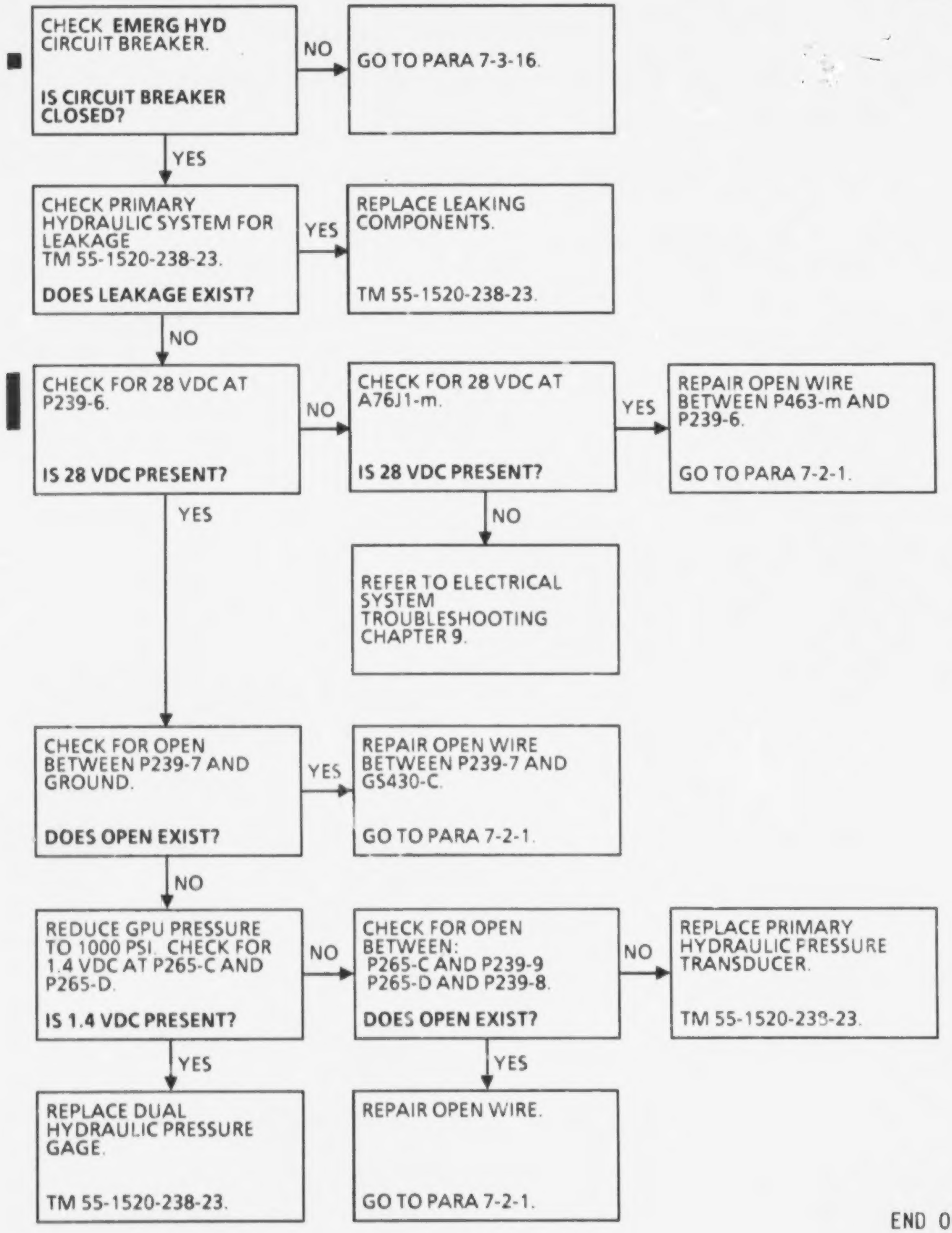

PRI HYD GAGE
HYD
6
4
3
2
0
PRI
UTIL
PSI X 1000

PILOT DUAL HYDRAULIC PRESSURE INDICATOR


EMERG HYD CIRCUIT BREAKER
FIRE EXTGH
PLT
CPG
APU
FUEL
VLV ACTR
FILL
APU
ENG WARN
JETT
EMERG HYD
TRIM
RDR ALT
STBY ATTD
THROT
ENG CUT
ENG LVR
ENG START
MM
UHF AM
KY 28
VHF FM
ICS
PITOT HTR
RDR WARN
RTR BRK
APU HOLD
CHAFF
EMERG BATT
5
10
7½

PILOT CIRCUIT BREAKER PANEL

MM04/1-702



CHECK **EMERG HYD** CIRCUIT BREAKER.
IS CIRCUIT BREAKER CLOSED?
- NO: GO TO PARA 7-3-16.
- YES: CHECK PRIMARY HYDRAULIC SYSTEM FOR LEAKAGE TM 55-1520-238-23. **DOES LEAKAGE EXIST?**
  - YES: REPLACE LEAKING COMPONENTS. TM 55-1520-238-23.
  - NO: CHECK FOR 28 VDC AT P239-6. **IS 28 VDC PRESENT?**
    - NO: CHECK FOR 28 VDC AT A76J1-m. **IS 28 VDC PRESENT?**
      - YES: REPAIR OPEN WIRE BETWEEN P463-m AND P239-6. GO TO PARA 7-2-1.
      - NO: REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING CHAPTER 9.
    - YES: CHECK FOR OPEN BETWEEN P239-7 AND GROUND. **DOES OPEN EXIST?**
      - YES: REPAIR OPEN WIRE BETWEEN P239-7 AND GS430-C. GO TO PARA 7-2-1.
      - NO: REDUCE GPU PRESSURE TO 1000 PSI. CHECK FOR 1.4 VDC AT P265-C AND P265-D. **IS 1.4 VDC PRESENT?**
        - YES: REPLACE DUAL HYDRAULIC PRESSURE GAGE. TM 55-1520-238-23.
        - NO: CHECK FOR OPEN BETWEEN: P265-C AND P239-9 P265-D AND P239-8. **DOES OPEN EXIST?**
          - YES: REPAIR OPEN WIRE. GO TO PARA 7-2-1.
          - NO: REPLACE PRIMARY HYDRAULIC PRESSURE TRANSDUCER. TM 55-1520-238-23.

END OF TASK

7-2-4. HYDRAULIC HAND PUMP DOES NOT SERVICE PRI HYD MANIFOLD RESERVOIR

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665

Personnel Required:

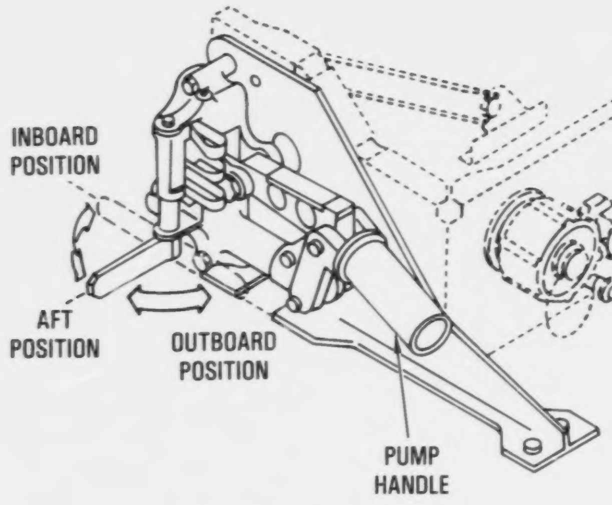
67R10 Attack Helicopter Repairer

References:

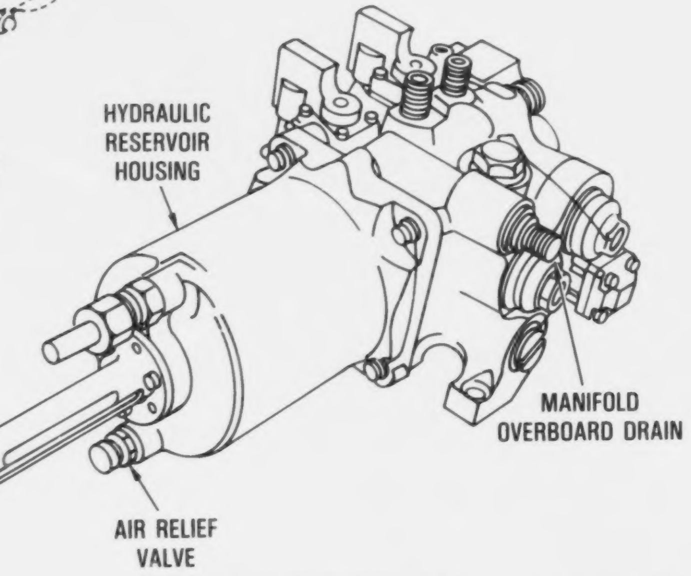
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed

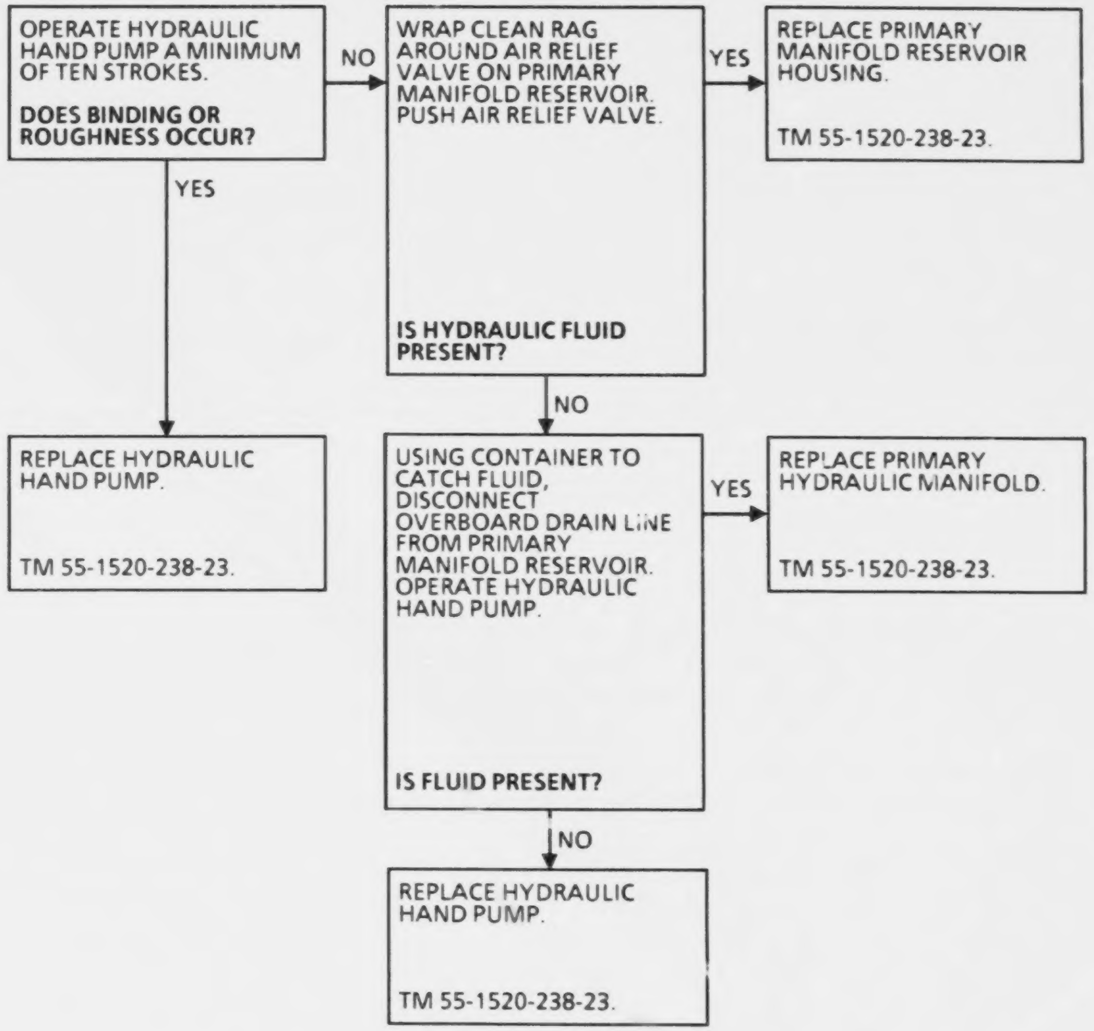

INBOARD POSITION
AFT POSITION
OUTBOARD POSITION
PUMP HANDLE

HYDRAULIC HAND PUMP


HYDRAULIC RESERVOIR HOUSING
MANIFOLD OVERBOARD DRAIN
AIR RELIEF VALVE

PRIMARY HYDRAULIC MANIFOLD

MM04/1-703



OPERATE HYDRAULIC HAND PUMP A MINIMUM OF TEN STROKES.

DOES BINDING OR ROUGHNESS OCCUR?

YES → REPLACE HYDRAULIC HAND PUMP. TM 55-1520-238-23.

NO → WRAP CLEAN RAG AROUND AIR RELIEF VALVE ON PRIMARY MANIFOLD RESERVOIR. PUSH AIR RELIEF VALVE.

IS HYDRAULIC FLUID PRESENT?

YES → REPLACE PRIMARY MANIFOLD RESERVOIR HOUSING. TM 55-1520-238-23.

NO → USING CONTAINER TO CATCH FLUID, DISCONNECT OVERBOARD DRAIN LINE FROM PRIMARY MANIFOLD RESERVOIR. OPERATE HYDRAULIC HAND PUMP.

IS FLUID PRESENT?

YES → REPLACE PRIMARY HYDRAULIC MANIFOLD. TM 55-1520-238-23.

NO → REPLACE HYDRAULIC HAND PUMP. TM 55-1520-238-23.

END OF TASK

7-2-5. PRI HYD PSI CAUTION LIGHT IS ON

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

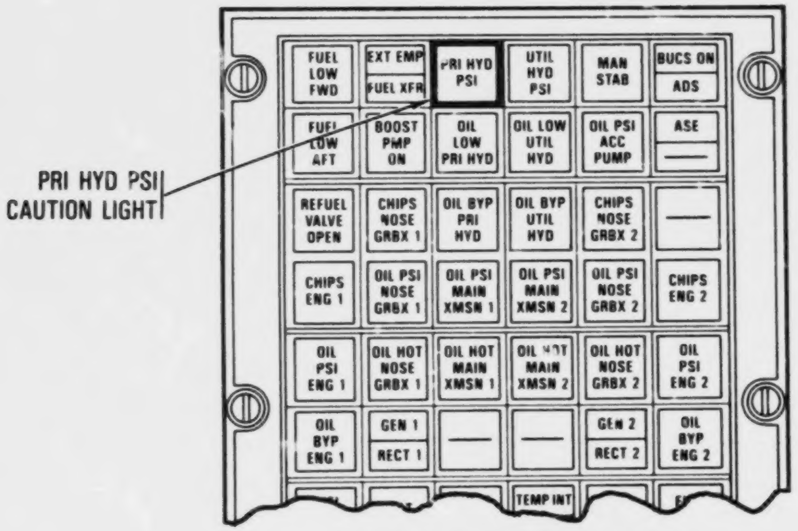
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (primary)
	Access provisions - L200 access panel removed
Para 1-3-2	ICS connected

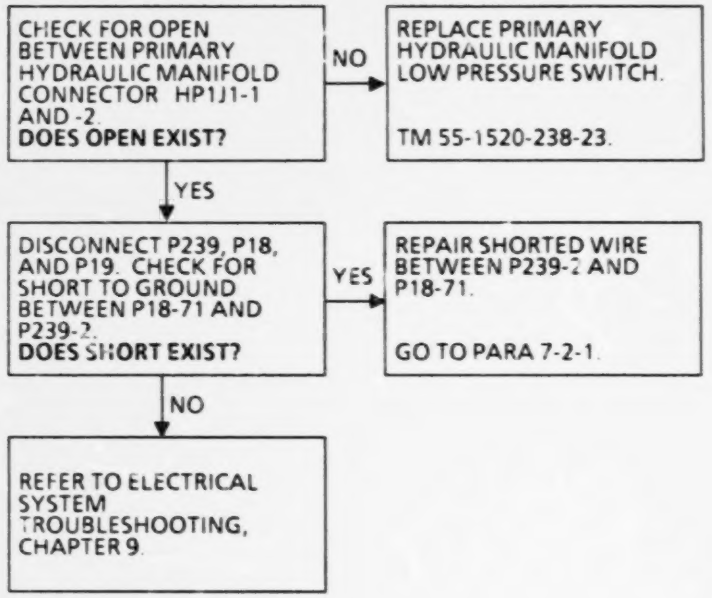

PRI HYD PSI CAUTION LIGHT
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
TEMP INT

PILOT CAUTION/WARNING PANEL

MM04/1-704

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR OPEN BETWEEN PRIMARY HYDRAULIC MANIFOLD CONNECTOR HP1J1-1 AND -2. DOES OPEN EXIST?
NO
REPLACE PRIMARY HYDRAULIC MANIFOLD LOW PRESSURE SWITCH. TM 55-1520-238-23.
YES
DISCONNECT P239, P18, AND P19. CHECK FOR SHORT TO GROUND BETWEEN P18-71 AND P239-2. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN P239-2 AND P18-71. GO TO PARA 7-2-1.
NO
REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

END OF TASK

7-2-6. OIL LOW PRI HYD INDICATOR IS LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

66F10 Aircraft Electrician

References:

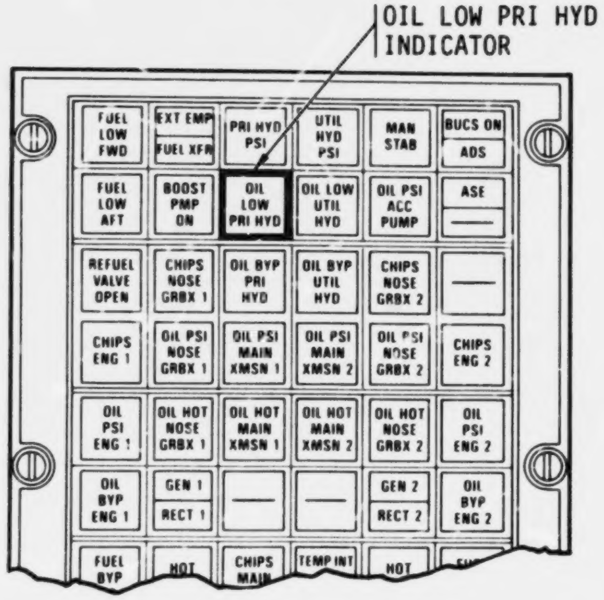
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Hydraulic system leak check - completed

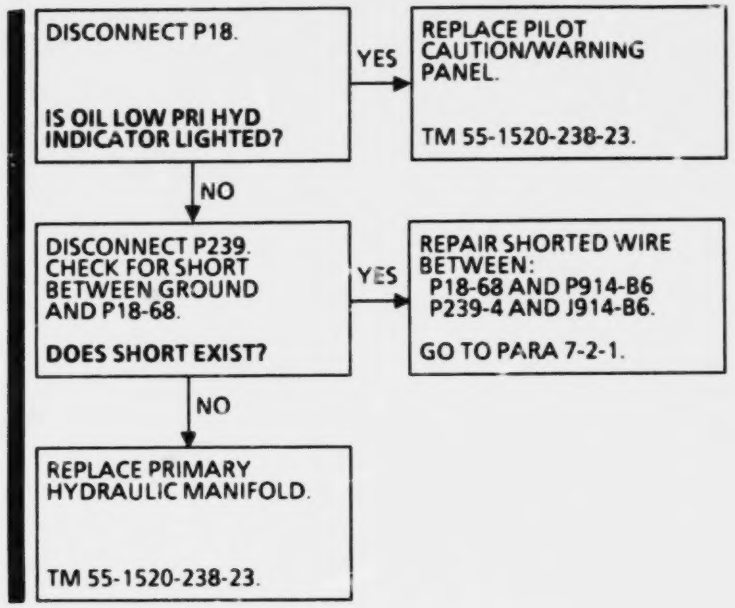
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OIL LOW PRI HYD INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP
HOT
CHIPS MAIN
TEMP INT
HOT

PILOT CAUTION/WARNING PANEL

MM04/1-1559


DISCONNECT P18.
IS OIL LOW PRI HYD INDICATOR LIGHTED?
YES
REPLACE PILOT CAUTION/WARNING PANEL.
TM 55-1520-238-23.
NO
DISCONNECT P239. CHECK FOR SHORT BETWEEN GROUND AND P18-68.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN: P18-68 AND P914-B6 P239-4 AND J914-B6.
GO TO PARA 7-2-1.
NO
REPLACE PRIMARY HYDRAULIC MANIFOLD.
TM 55-1520-238-23.

END OF TASK

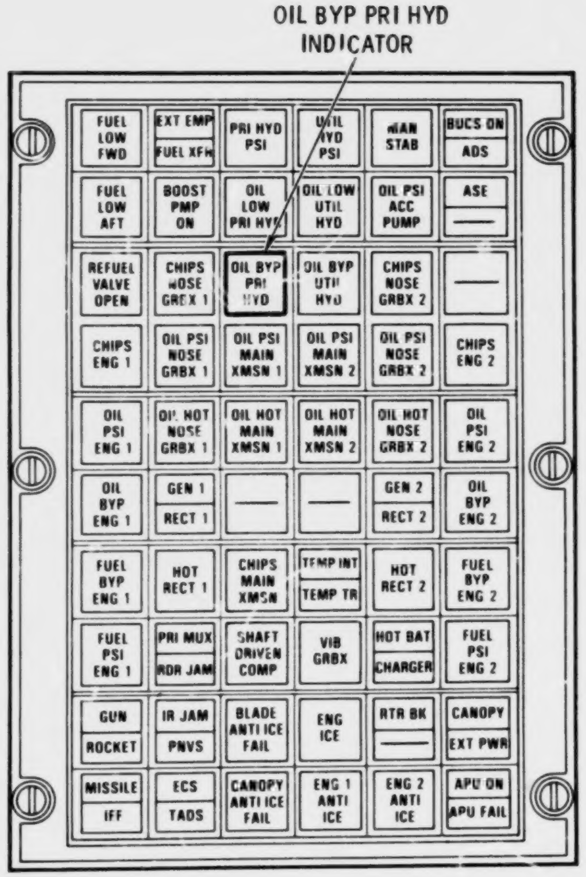
7-2-7. OIL BYP PRI HYD INDICATOR IS LIGHTED

Tools: (para 7-2-6)

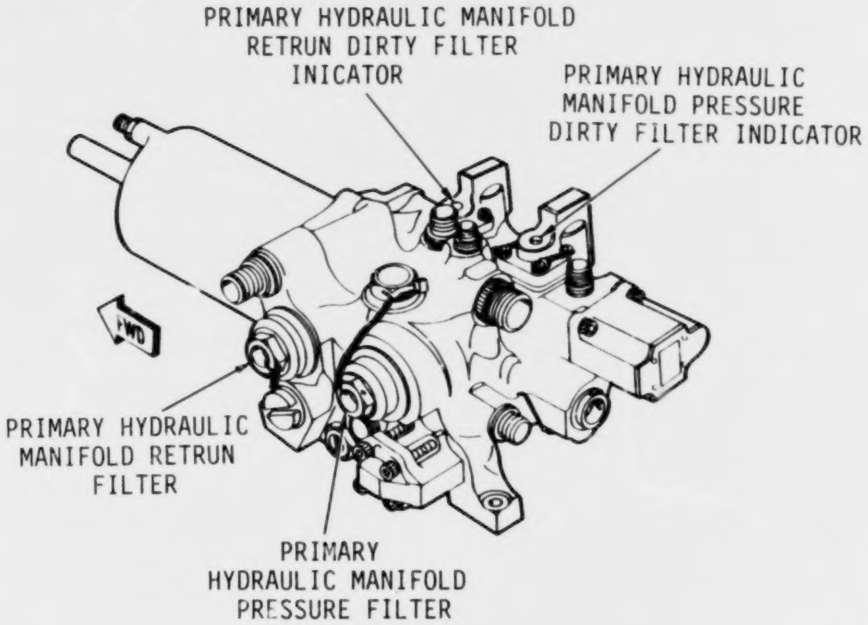
Personnel Required: (para 7-2-6)

References: (para 7-2-6)

Equipment Conditions: (para 7-2-6)

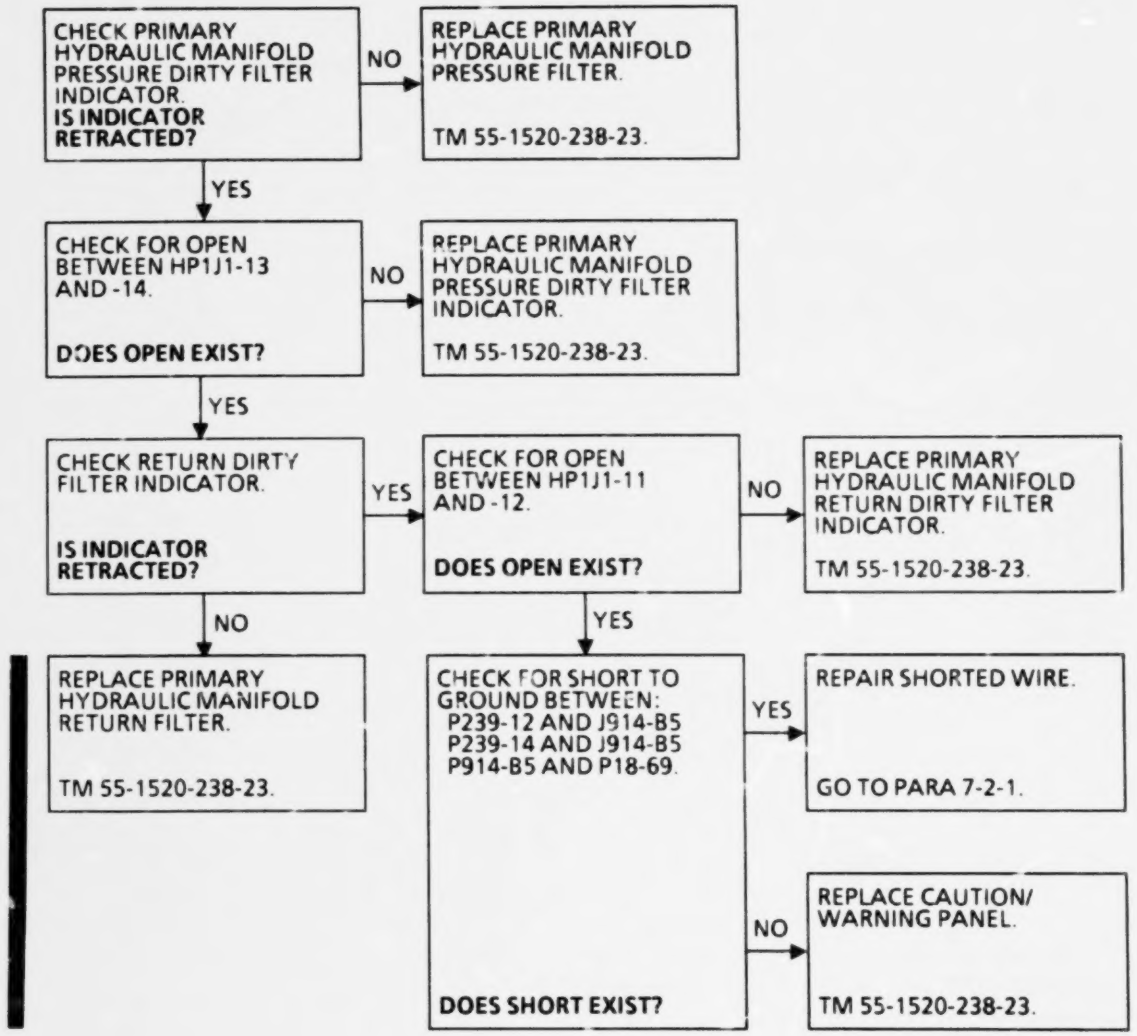

OIL BYP PRI HYD INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL


PRIMARY HYDRAULIC MANIFOLD RETRUN DIRTY FILTER INICATOR
PRIMARY HYDRAULIC MANIFOLD PRESSURE DIRTY FILTER INDICATOR
FWD
PRIMARY HYDRAULIC MANIFOLD RETRUN FILTER
PRIMARY HYDRAULIC MANIFOLD PRESSURE FILTER

PRIMARY HYDRAULIC MANIFOLD

MM04/1-706A



CHECK PRIMARY HYDRAULIC MANIFOLD PRESSURE DIRTY FILTER INDICATOR. **IS INDICATOR RETRACTED?**

NO: REPLACE PRIMARY HYDRAULIC MANIFOLD PRESSURE FILTER. TM 55-1520-238-23.

YES: CHECK FOR OPEN BETWEEN HP1J1-13 AND -14. **DOES OPEN EXIST?**

NO: REPLACE PRIMARY HYDRAULIC MANIFOLD PRESSURE DIRTY FILTER INDICATOR. TM 55-1520-238-23.

YES: CHECK RETURN DIRTY FILTER INDICATOR. **IS INDICATOR RETRACTED?**

NO: REPLACE PRIMARY HYDRAULIC MANIFOLD RETURN FILTER. TM 55-1520-238-23.

YES: CHECK FOR OPEN BETWEEN HP1J1-11 AND -12. **DOES OPEN EXIST?**

NO: REPLACE PRIMARY HYDRAULIC MANIFOLD RETURN DIRTY FILTER INDICATOR. TM 55-1520-238-23.

YES: CHECK FOR SHORT TO GROUND BETWEEN:
P239-12 AND J914-B5
P239-14 AND J914-B5
P914-B5 AND P18-69.
DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE. GO TO PARA 7-2-1.

NO: REPLACE CAUTION/WARNING PANEL. TM 55-1520-238-23.

END OF TASK

7-2-8. PRI HYD CAUTION LIGHT IS ON

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Mechanics	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit, Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

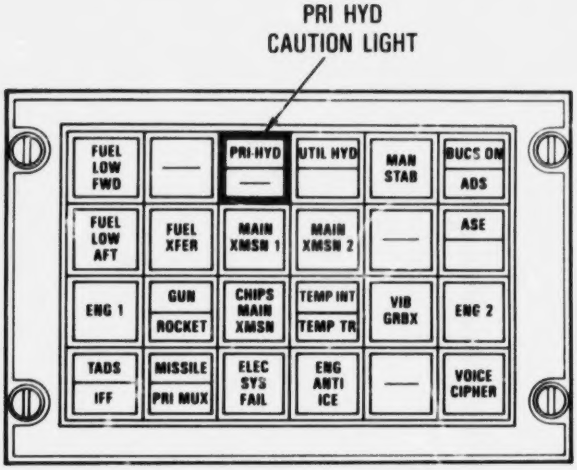
67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
Para 1-3-2	ICS connected

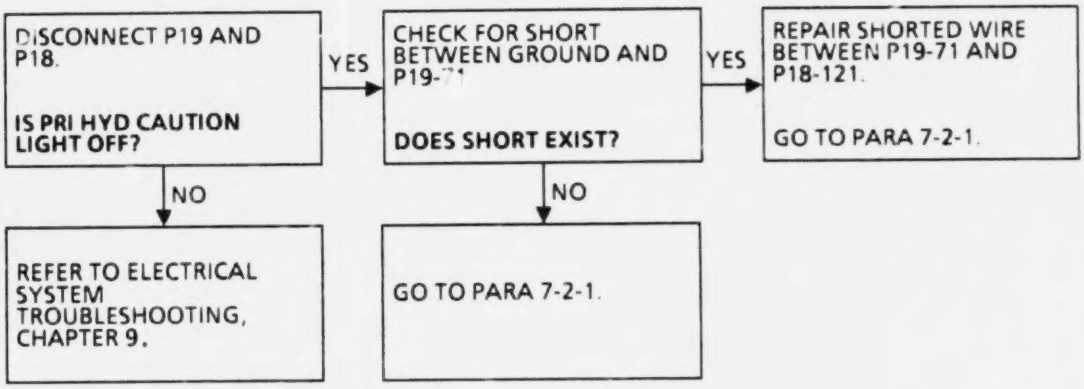

PRI HYD
CAUTION LIGHT
FUEL LOW FWD
—
PRI-HYD
—
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
—
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
—
VOICE CIPHER

CPG CAUTION/WARNING PANEL

MM04/1-707

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



DISCONNECT P19 AND P18.

IS PRI HYD CAUTION LIGHT OFF?

CHECK FOR SHORT BETWEEN GROUND AND P19-71.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P19-71 AND P18-121.

GO TO PARA 7-2-1.

REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

GO TO PARA 7-2-1.

END OF TASK

7-2-9. PRI HYD GAGE DOES NOT INDICATE 3000 PSI (APU OPERATING)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanics	5180-00-323-4692
Service Unit Hydraulic Fluid	1730-00-102-8665

Personnel Required:

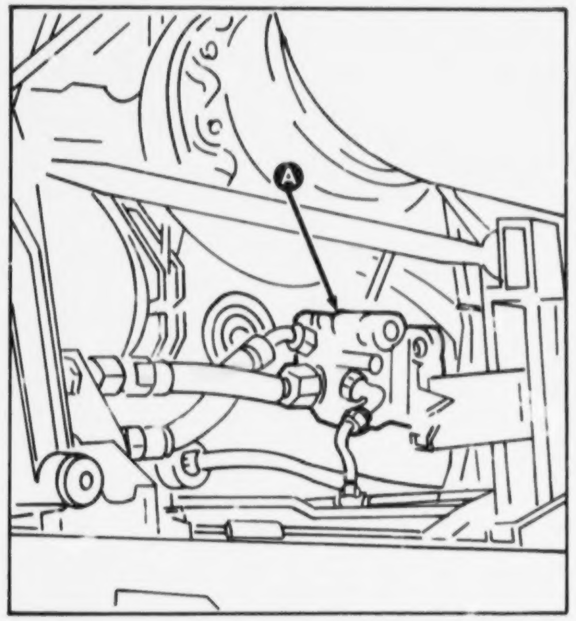
67R20 Attack Helicopter Repairer
67R10 Attack Helicopter Repairer
One person to assist

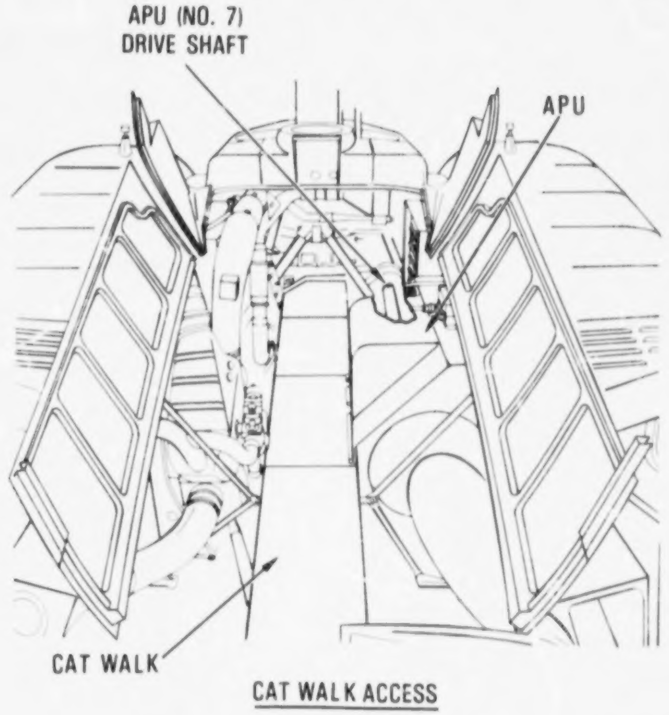
References:

TM 55-1520-238-23

Equipment Conditions:

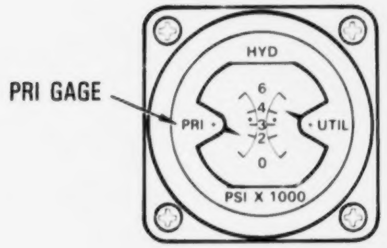
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	APU operating
Para 1-3-2	ICS connected



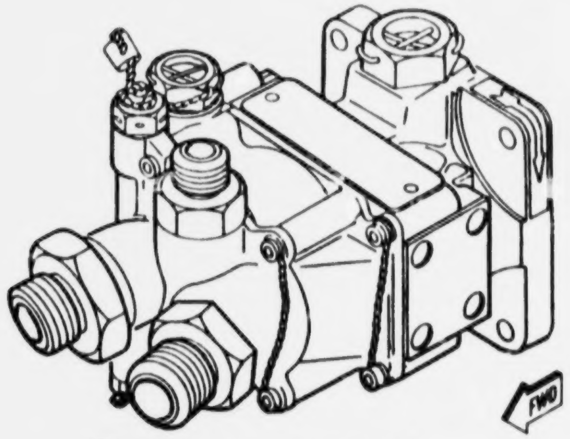


CAT WALK ACCESS

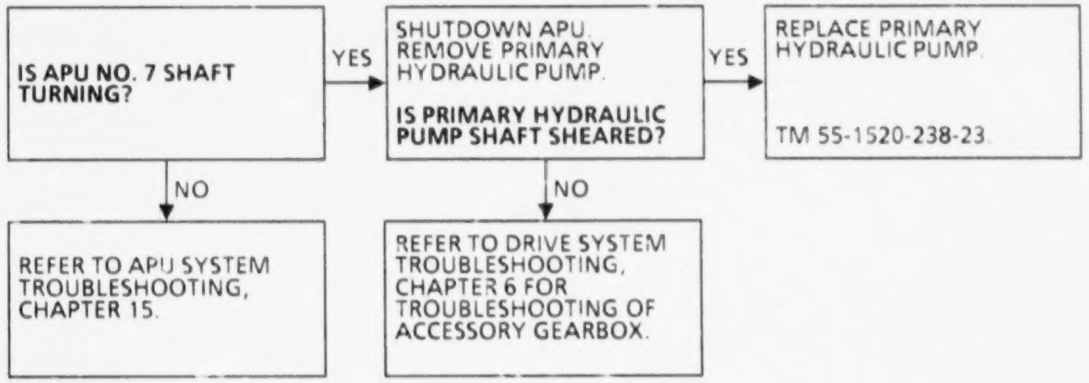
MM04/1-708



PILOT DUAL HYDRAULIC PRESSURE INDICATOR



A PRIMARY HYDRAULIC PUMP



IS APU NO. 7 SHAFT TURNING?

YES

SHUTDOWN APU. REMOVE PRIMARY HYDRAULIC PUMP.

IS PRIMARY HYDRAULIC PUMP SHAFT SHEARED?

YES

REPLACE PRIMARY HYDRAULIC PUMP.

TM 55-1520-238-23.

NO

REFER TO APU SYSTEM TROUBLESHOOTING, CHAPTER 15.

NO

REFER TO DRIVE SYSTEM TROUBLESHOOTING, CHAPTER 6 FOR TROUBLESHOOTING OF ACCESSORY GEARBOX.

END OF TASK

7-2-10. DUAL HYDRAULIC PRESSURE INDICATOR EDGE LIGHT DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

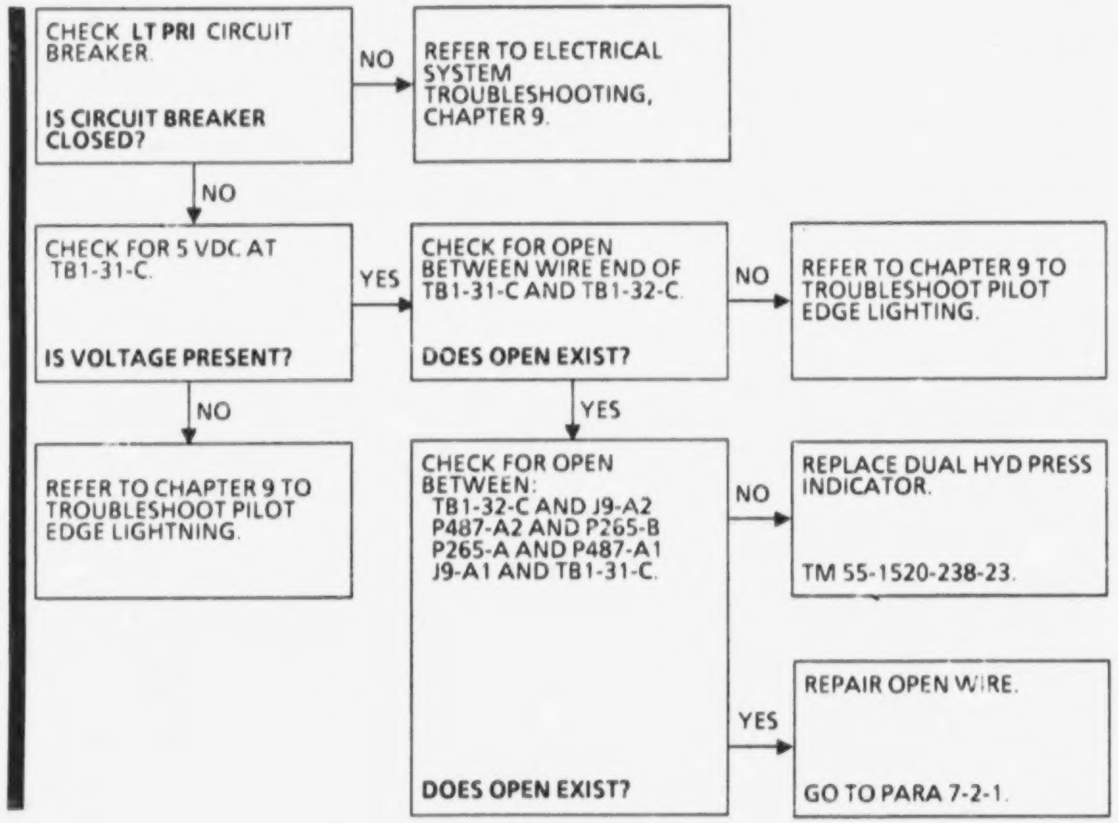
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

NOTE

When reference is made to this paragraph from another section, upon completion of this task, return to the operational check in the other section.



CHECK **LT PRI** CIRCUIT BREAKER.

IS CIRCUIT BREAKER CLOSED?

NO → REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

NO ↓

CHECK FOR 5 VDC AT TB1-31-C.

IS VOLTAGE PRESENT?

NO ↓ REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE LIGHTNING.

YES → CHECK FOR OPEN BETWEEN WIRE END OF TB1-31-C AND TB1-32-C.

DOES OPEN EXIST?

NO → REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE LIGHTING.

YES ↓

CHECK FOR OPEN BETWEEN:
TB1-32-C AND J9-A2
P487-A2 AND P265-B
P265-A AND P487-A1
J9-A1 AND TB1-31-C.

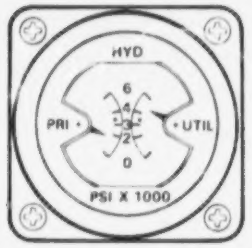
DOES OPEN EXIST?

NO → REPLACE DUAL HYD PRESS INDICATOR.

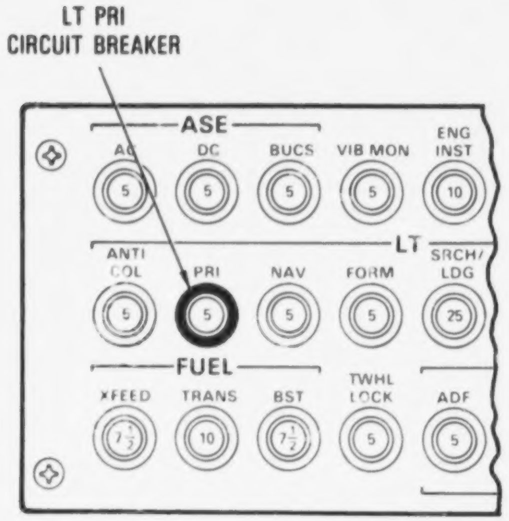
TM 55-1520-238-23.

YES → REPAIR OPEN WIRE.

GO TO PARA 7-2-1.


HYD
6
4
3
2
0
PRI
UTIL
PSI X 1000

PILOT DUAL HYRAULIC PRESSURE INDICATOR


LT PRI
CIRCUIT BREAKER
ASE
AC
DC
BUCS
VIB MON
ENG INST
5
5
5
5
10
LT
ANTI COL
PRI
NAV
FORM
SRCH/LDG
5
5
5
5
25
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
7½
10
7½
5
5

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-796

END OF TASK

7-2-11. PRI HYD PSI INDICATOR - IS NOT LIGHTED WITH NO PRIMARY HYDRAULIC SYSTEM PRESSURE INDICATED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

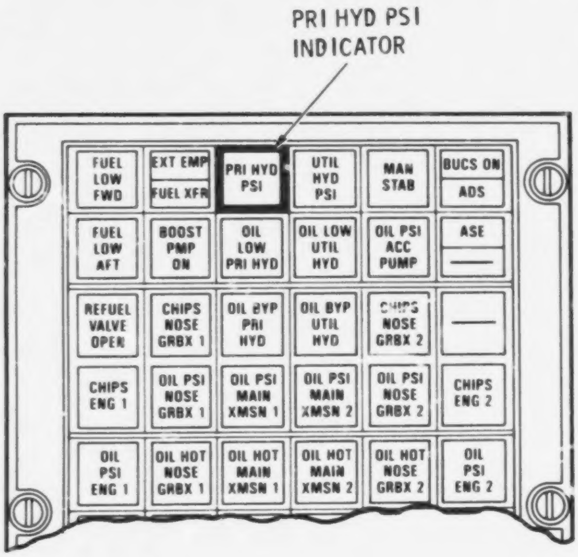
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed Access provisions - L200 panel removed

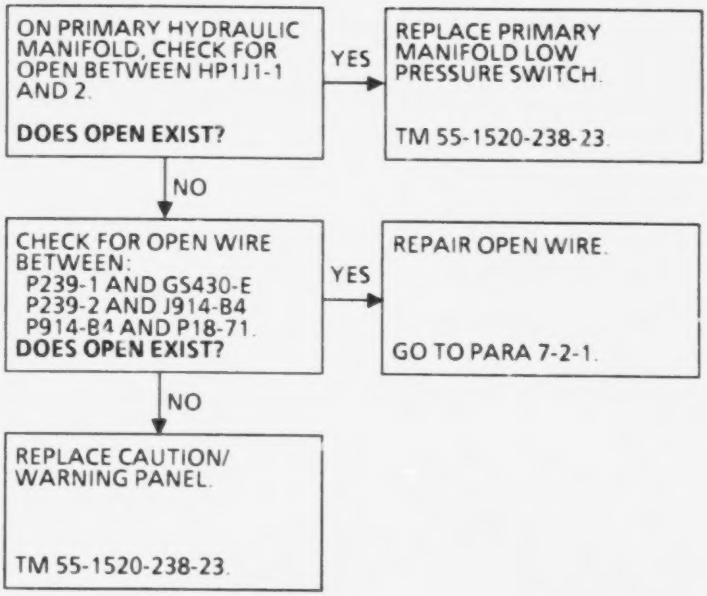


PRI HYD PSI INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2

PILOT CAUTION/WARNING PANEL

MM04/1-1452

7-2-11


ON PRIMARY HYDRAULIC MANIFOLD, CHECK FOR OPEN BETWEEN HP1J1-1 AND 2.
DOES OPEN EXIST?
YES
REPLACE PRIMARY MANIFOLD LOW PRESSURE SWITCH.
TM 55-1520-238-23.
NO
CHECK FOR OPEN WIRE BETWEEN:
P239-1 AND GS430-E
P239-2 AND J914-B4
P914-B4 AND P18-71.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 7-2-1.
NO
REPLACE CAUTION/ WARNING PANEL.
TM 55-1520-238-23.

END OF TASK

7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Service Unit Hydraulic Fluid	1730-00-102-8666
Caliper, Inside	5210-00-229-3060

References:

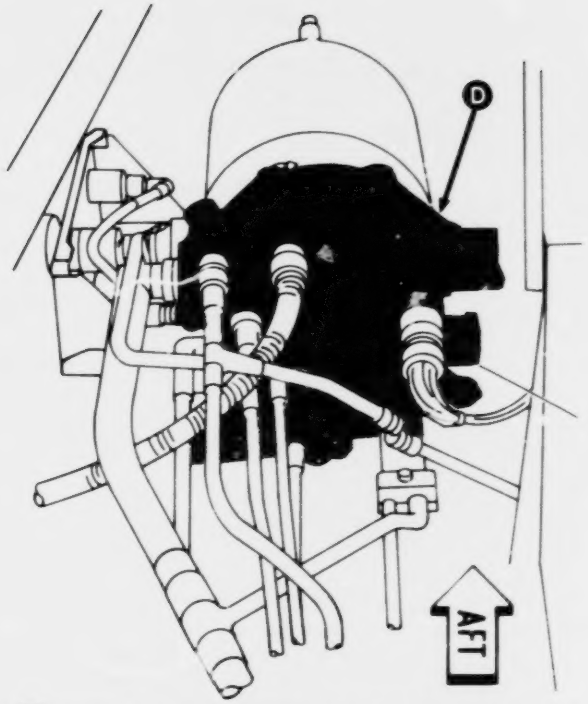
TM 55-1520-238-23
TM 55-1520-238-PMS

Equipment Conditions:

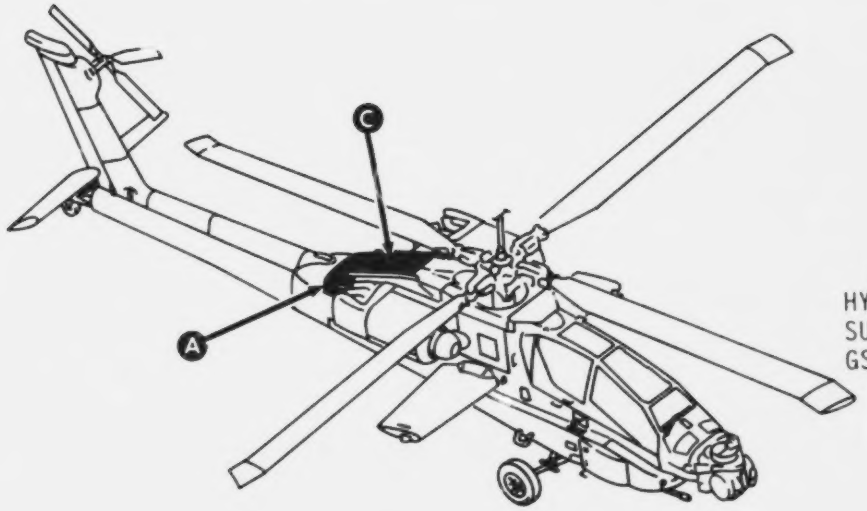
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (utility) - Pressurized air
Para 1-3-2	ICS connected

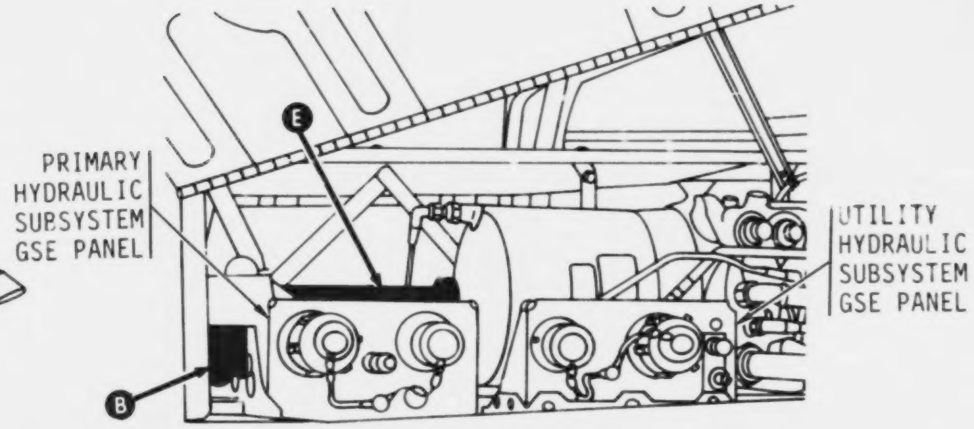
Personnel Required:

67R10 Attack Helicopter Repairer
One person to assist

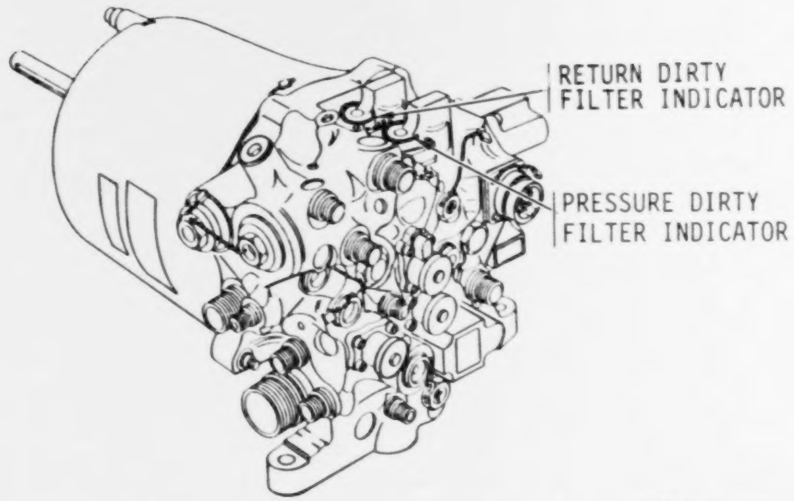


C ACCESS TO UTILITY HYDRAULIC MANIFOLD THRU T209R, T290L, AND L325 (LOOKING AFT)




PRIMARY HYDRAULIC SUBSYSTEM GSE PANEL
E
B
UTILITY HYDRAULIC SUBSYSTEM GSE PANEL

A ACCESS TO GSE PANELS THRU R325


RETURN DIRTY FILTER INDICATOR
PRESSURE DIRTY FILTER INDICATOR

D UTILITY HYDRAULIC MANIFOLD

MM04/1-723-1B

GO TO NEXT PAGE

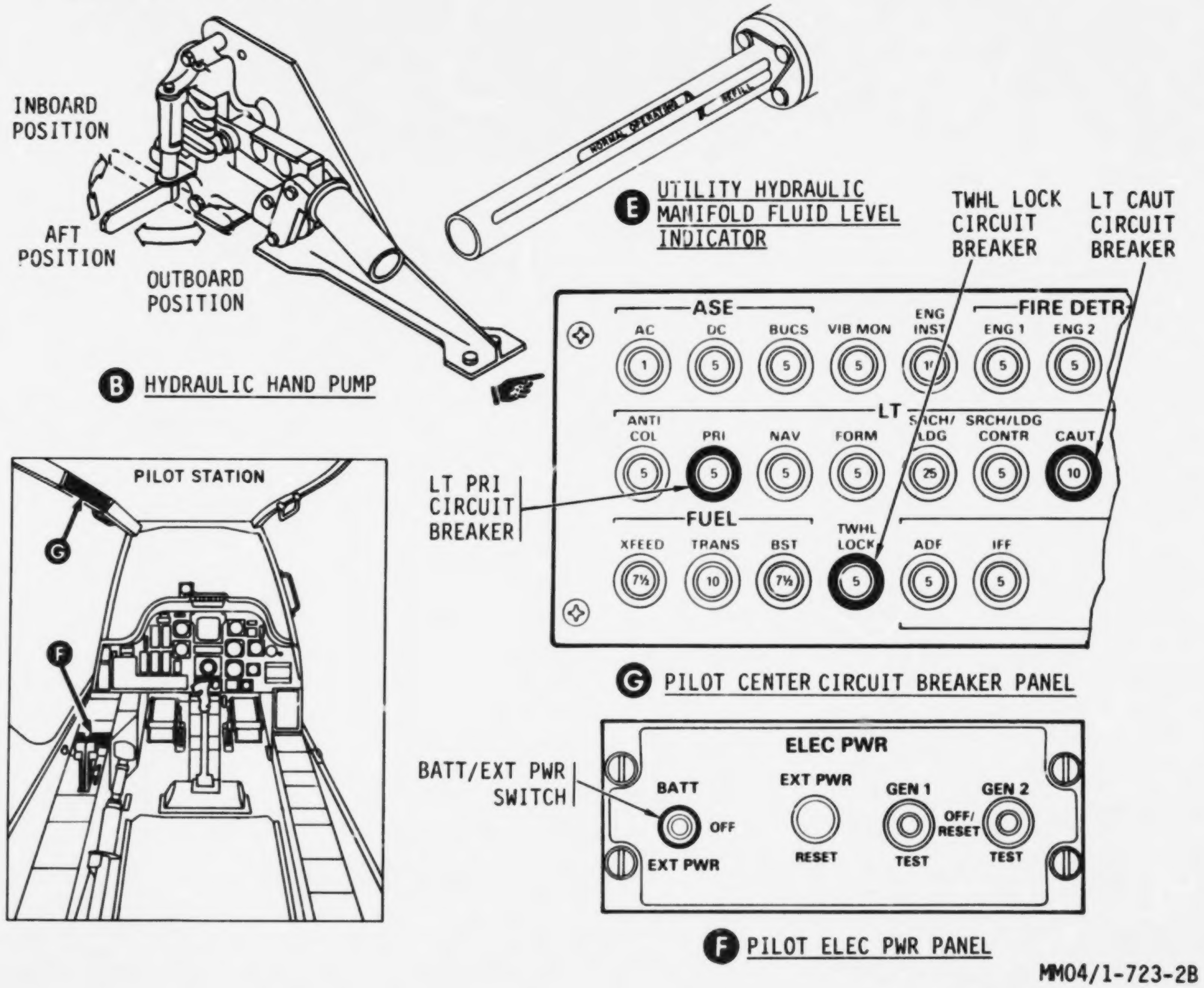
7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

A. Perform visual check of utility hydraulic system with AGPU operating (TM 55-1520-238-PMS). Replace any leaking component (TM 55-1520-238-23).

B. If rotors begin to turn when utility hydraulic external power is applied replace utility hydraulic pump outlet check valve (TM 55-1520-238-23).

C. Do not close access doors or install access panels until operational check is completed.

D. Remove external pressurized air and utility hydraulic power (TM 55-1520-238-23).


INBOARD POSITION
AFT POSITION
OUTBOARD POSITION
NORMAL OPERATING
REFILL
TWHL LOCK CIRCUIT BREAKER
LT CAUT CIRCUIT BREAKER
ASE
AC
DC
BUCS
VIB MON
ENG INST
FIRE DETR
ENG 1
ENG 2
LT
ANTI COL
PRI
NAV
FORM
SRCH/LDG
SRCH/LDG CONTR
CAUT
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
IFF
LT PRI CIRCUIT BREAKER
PILOT STATION
G
F
BATT/EXT PWR SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
GEN 2
OFF/RESET
TEST
TEST

B HYDRAULIC HAND PUMP

E UTILITY HYDRAULIC MANIFOLD FLUID LEVEL INDICATOR

G PILOT CENTER CIRCUIT BREAKER PANEL

F PILOT ELEC PWR PANEL

MM04/1-723-2B

WARNING

The hydraulic system is pressurized to 3000 psi. Be certain that trapped hydraulic pressure is released before loosening any connections. Failure to do so could result in death or serious injury. If injury occurs, get medical aid immediately.

NOTE

Total utility system fluid volume is 2.60 gallons.

E. Drain utility reservoir to REFILL level, if required (TM 55-1520-238-23).

NOTE

Decal on access door R325 shows proper positioning of selector valve of hydraulic hand pump.

F. Set hydraulic hand pump selector valve to OUTBOARD.

G. On pilot center circuit breaker panel, close the LT PRI, LT CAUT, and TWHL LOCK circuit breakers.

H. Complete operational check as follows:

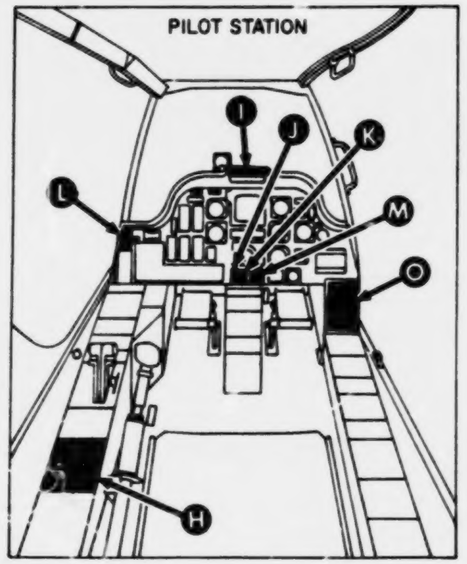
NOTE

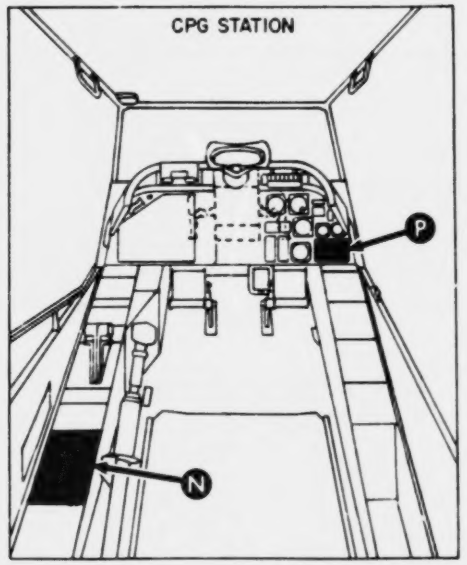
When a result sends you to a task out of this section, and the task is completed, repeat this operational check.

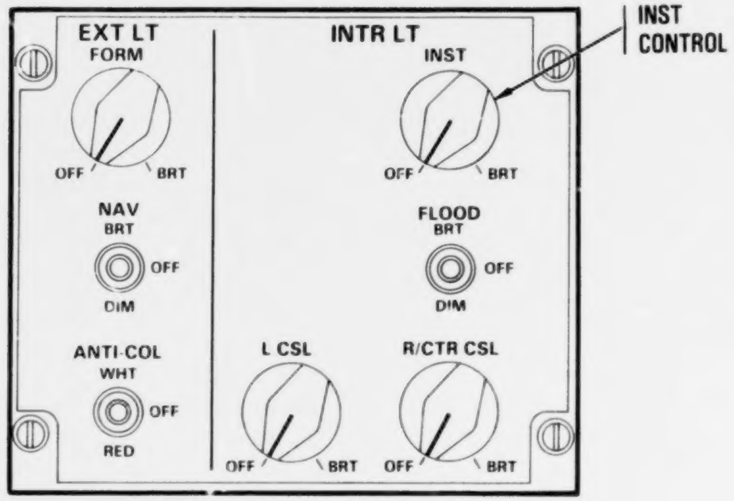
TASK	RESULT
1. Using hydraulic hand pump handle, fill utility hydraulic manifold reservoir to normal operating level (TM 55-1520-238-23).	If hydraulic hand pump does not service utility hydraulic manifold reservoir, go to para 7-3-4.
2. Set hydraulic hand pump selector valve to AFT. On pilot caution/warning panel, check UTIL HYD PSI indicator.	If UTIL HYD PSI indicator is not on, to to para 7-3-24.
3. Perform external power application - Hydraulic (utility) (TM 55-1520-238-23).	

GO TO NEXT PAGE

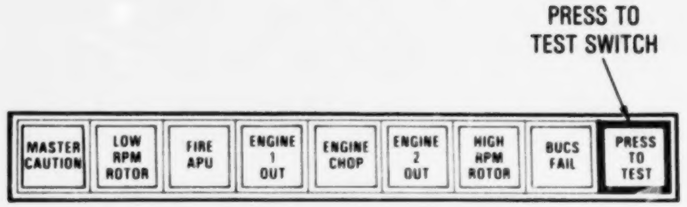
7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)


PILOT STATION
I
J
K
L
M
O
H

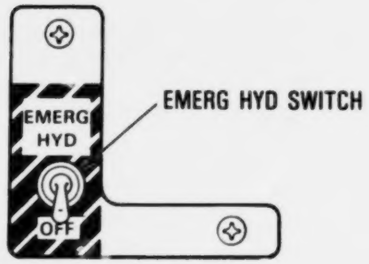

CPG STATION
P
N


EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI-COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R/CTR CSL
OFF
BRT
INST CONTROL

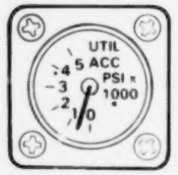
H PILOT EXT LT/INTR LT PANEL


PRESS TO TEST SWITCH
MASTER CAUTION
LOW RPM ROTOR
FIRE APU
ENGINE 1 OUT
ENGINE CHOP
ENGINE 2 OUT
HIGH RPM ROTOR
BUCS FAIL
PRESS TO TEST

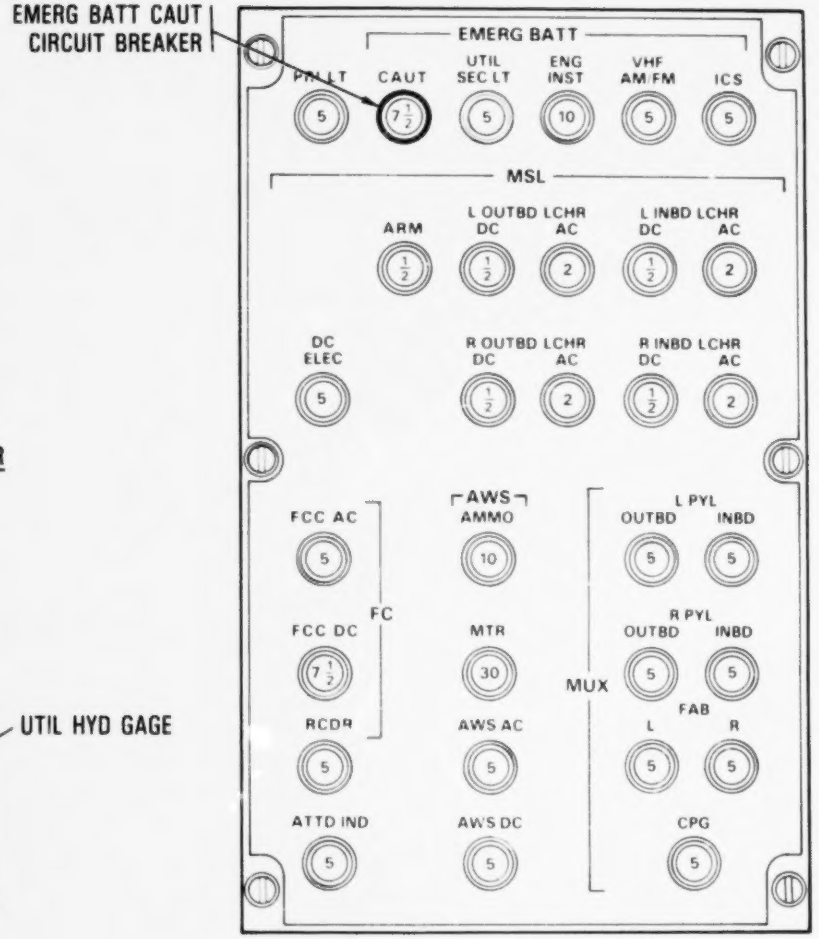
I PILOT MASTER CAUTION/WARNING PANEL


EMERG HYD
OFF
EMERG HYD SWITCH

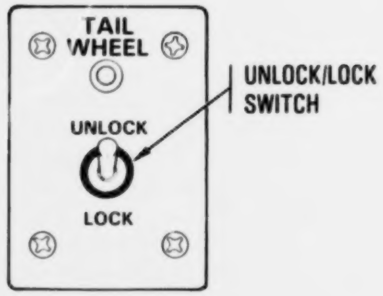
J EMERG HYD PANEL


UTIL ACC PSI x 1000
5
4
3
2
1
0

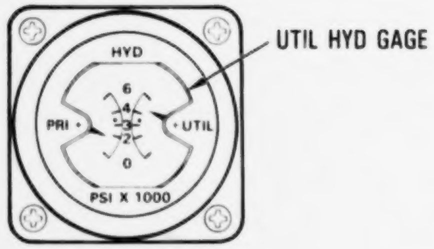
K UTIL ACC PSI INDICATOR


EMERG BATT CAUT CIRCUIT BREAKER
EMERG BATT
PRI LT 5
CAUT 7½
UTIL SEC LT 5
ENG INST 10
VHF AM/FM 5
ICS 5
MSL
ARM ½
L OUTBD LCHR DC ½
L OUTBD LCHR AC 2
L INBD LCHR DC ½
L INBD LCHR AC 2
DC ELEC 5
R OUTBD LCHR DC ½
R OUTBD LCHR AC 2
R INBD LCHR DC ½
R INBD LCHR AC 2
FCC AC 5
FC
FCC DC 7½
RCDR 5
ATTD IND 5
AWS
AMMO 10
MTR 30
AWS AC 5
AWS DC 5
MUX
L PYL
OUTBD 5
INBD 5
R PYL
OUTBD 5
INBD 5
FAB
L 5
R 5
CPG 5

N CPG CIRCUIT BREAKER PANEL NO. 1


TAIL WHEEL
UNLOCK
LOCK
UNLOCK/LOCK SWITCH

L TAIL WHEEL PANEL


HYD
PRI
UTIL
6
4
3
2
0
PSI X 1000
UTIL HYD GAGE

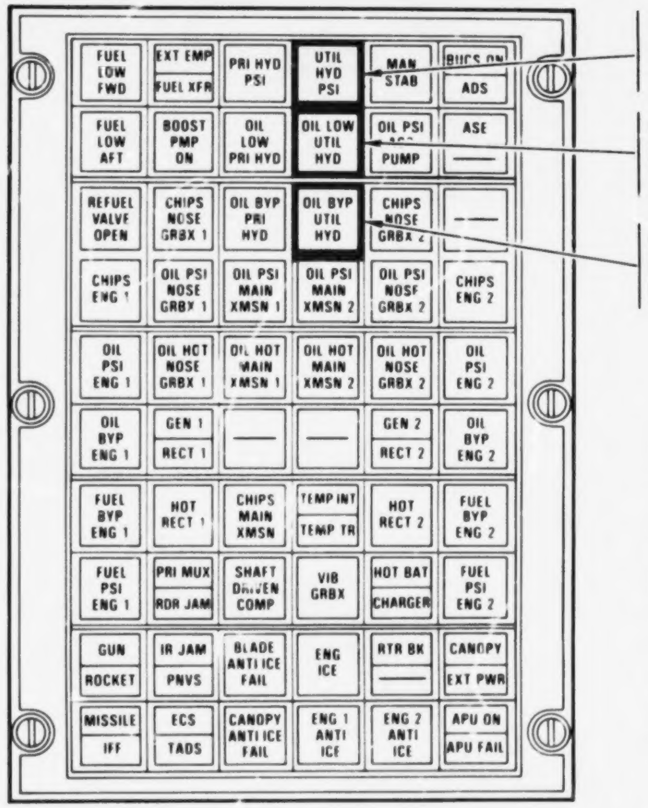
M DUAL HYDRAULIC PRESSURE GAGE

MM04/1-723-3A

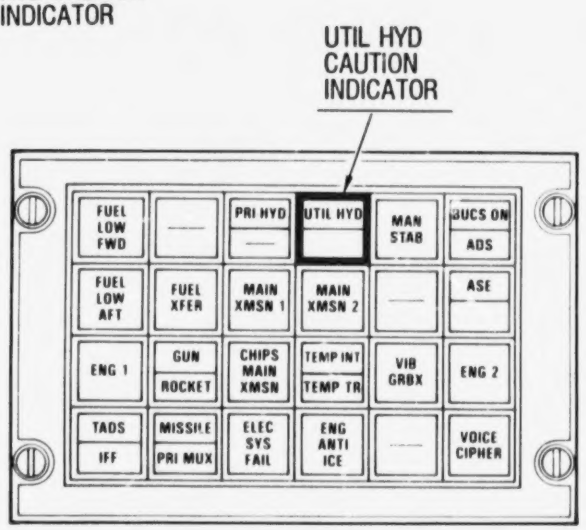
GO TO NEXT PAGE

7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

TASK	RESULT
4. On pilot master caution/warning panel, depress **PRESS TO TEST** switch. Check that all pilot master and caution/warning indicators are on; release **PRESS TO TEST**.	If any of the caution/warning display indicators are not on, refer to chapter 9 to troubleshoot electrical system.
5. On pilot instrument panel, check that dual hydraulic gage indicates 3000 psi on **UTIL**.	If **UTIL** on the dual hydraulic gage does not indicate 3000 psi, go to para 7-3-3. If **UTIL HYD PSI** indicator is lighted, go to para 7-3-5.


UTIL HYD PSI CAUTION INDICATOR
OIL LOW UTIL HYD CAUTION INDICATOR
OIL BYP UTIL HYD CAUTION INDICATOR
FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

Ⓞ PILOT CAUTION WARNING PANEL


UTIL HYD CAUTION INDICATOR
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

Ⓟ CPG CAUTION WARNING PANEL

MM04/1-723-4B

TASK	RESULT
6. On pilot caution/warning panel, check that **UTIL HYD PSI**, **OIL LOW UTIL HYD**, and **OIL BYP UTIL HYD** caution indicators are not lighted.	If **OIL LOW UTIL HYD** indicator is lighted, go to para 7-3-6. If **OIL BYP UTIL HYD** indicator is lighted, have assistant manually reset utility hydraulic manifold pressure and/or return dirty filter indicator. If indicators are retracted, or if indicators pop up after manual reset, go to para 7-3-7.
7. On CPG circuit breaker panel No. 1, close **EMERG BATT CAUT** circuit breaker.	If circuit breaker does not stay closed, refer to chapter 9 to troubleshoot CPG caution/warning system.
8. On CPG caution/warning panel, check **UTIL HYD** caution indicator is off.	If **UTIL HYD** indicator is lighted, go to para 7-3-8.
9. On pilot **EXT LT/INT LT** panel, set **INST** control to **BRT**.	

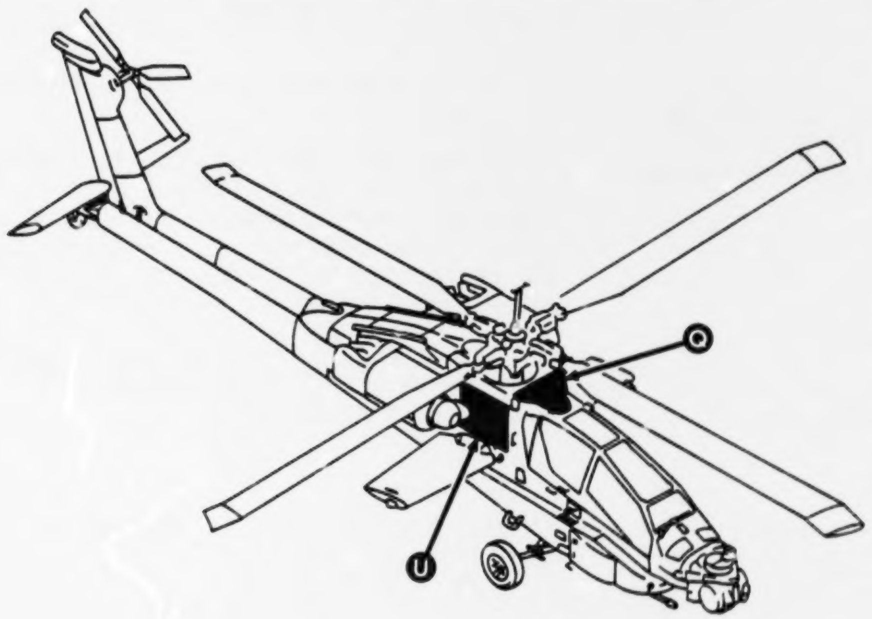
NOTE

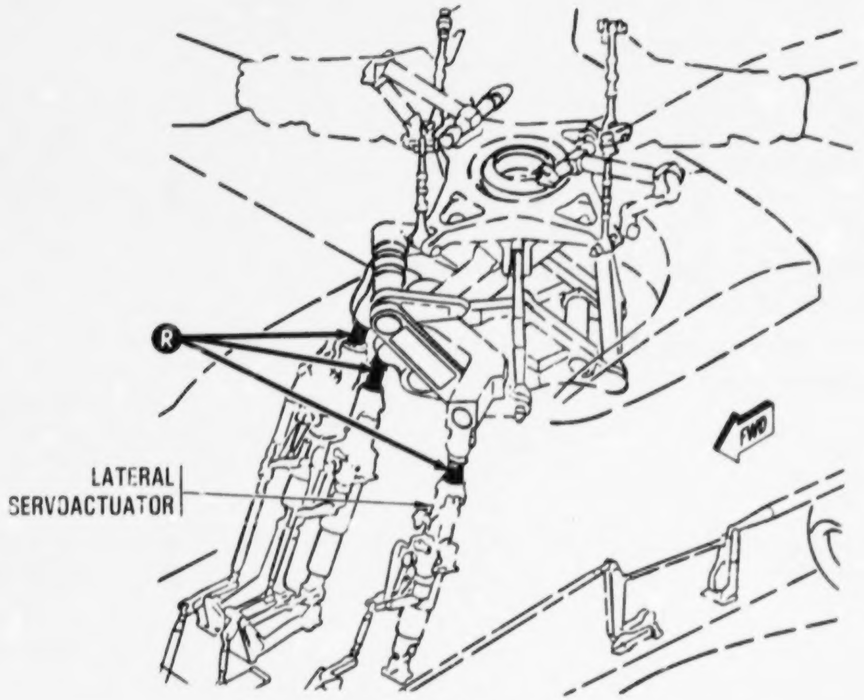
When a result sends you to a task out of this section, and the task is completed, repeat this operational check.

TASK	RESULT
10. On pilot instrument panel, check that dual hydraulic pressure indicator edge-light is lighted.	If dual hydraulic pressure indicator edge-light is not lighted, go to para 7-2-10.
11. On pilot instrument panel, check that **UTIL ACC PSI** indicator edge-light is lighted.	If **UTIL ACC PSI** indicator edge-light is not lighted, go to para 7-3-21.
12. On pilot instrument panel, check that **TAIL WHEEL LOCK** panel edge-light is lighted.	If **TAIL WHEEL LOCK** panel edge-light is not lighted, go to para 7-3-22.
13. On pilot instrument panel, check that **EMERG HYD** panel edge-light is lighted.	If **EMERG HYD PANEL** edge-light is not lighted, go to para 7-3-23.

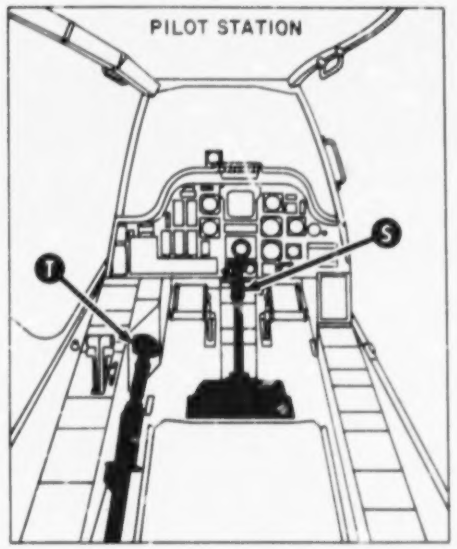
GO TO NEXT PAGE

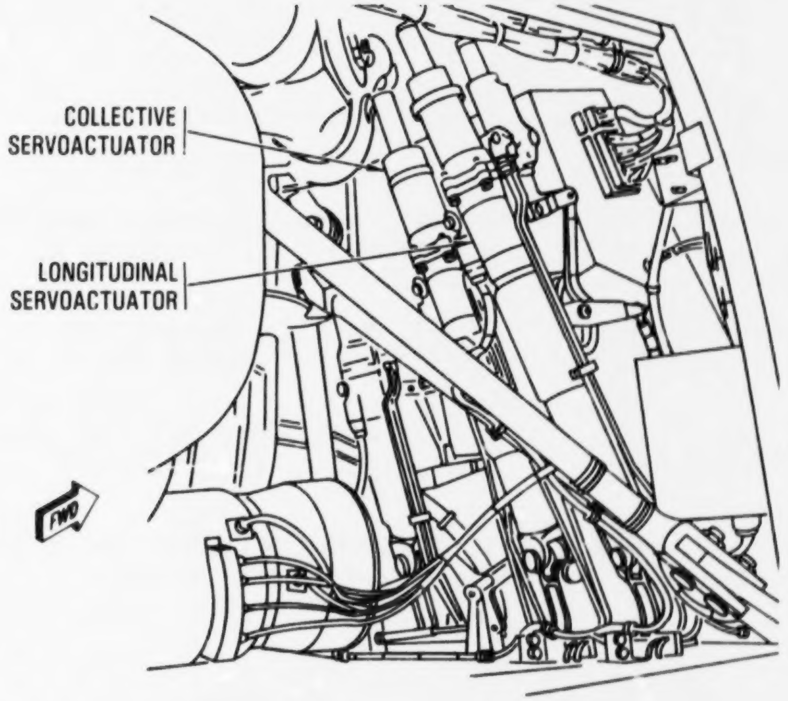
7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)



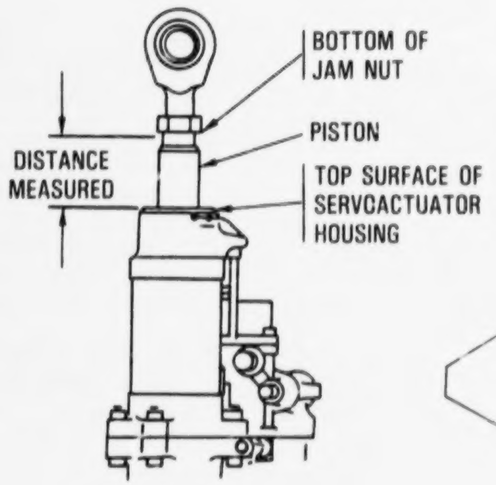

R
LATERAL SERVOACTUATOR
FWD

Ⓠ MAIN ROTOR FLIGHT CONTROL SERVOACTUATOR

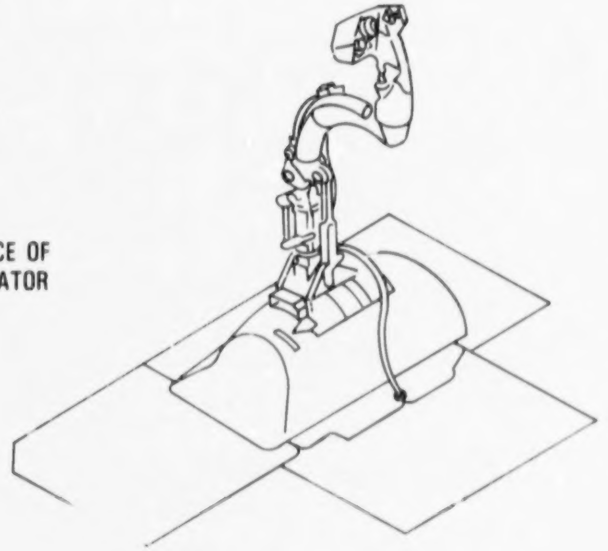

PILOT STATION
T
S


COLLECTIVE SERVOACTUATOR
LONGITUDINAL SERVOACTUATOR
FWD

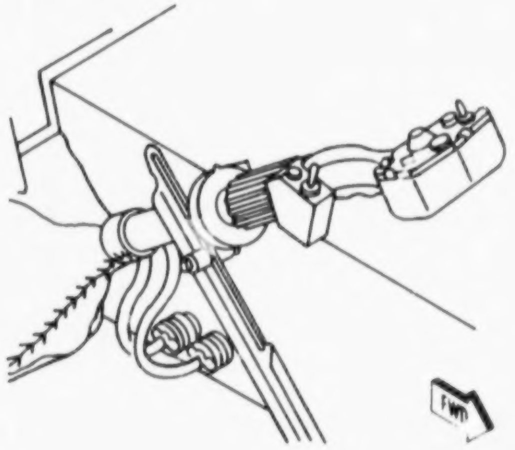
Ⓤ ACCESS TO SERVOACTUATORS THRU PANEL R200


BOTTOM OF JAM NUT
PISTON
DISTANCE MEASURED
TOP SURFACE OF SERVOACTUATOR HOUSING

Ⓡ SERVOACTUATOR (TYPICAL)



Ⓢ PILOT CYCLIC STICK



Ⓣ PILOT COLLECTIVE STICK

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GO TO NEXT PAGE

7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

WARNING

Maintenance personnel must be verbally warned prior to moving the collective or cyclic stick: Any control activated can result in sudden blade movement that can sever or crush fingers or hands. If injury occurs, get immediate medical help.

CAUTION

To prevent damage to flight control system components, do not use force if binding or roughness occurs while moving controls with hydraulic power. Prior to continuing the procedure, clear controls of binding. Failure to clear controls of binding may result in sheared pins in the control axis.

NOTE

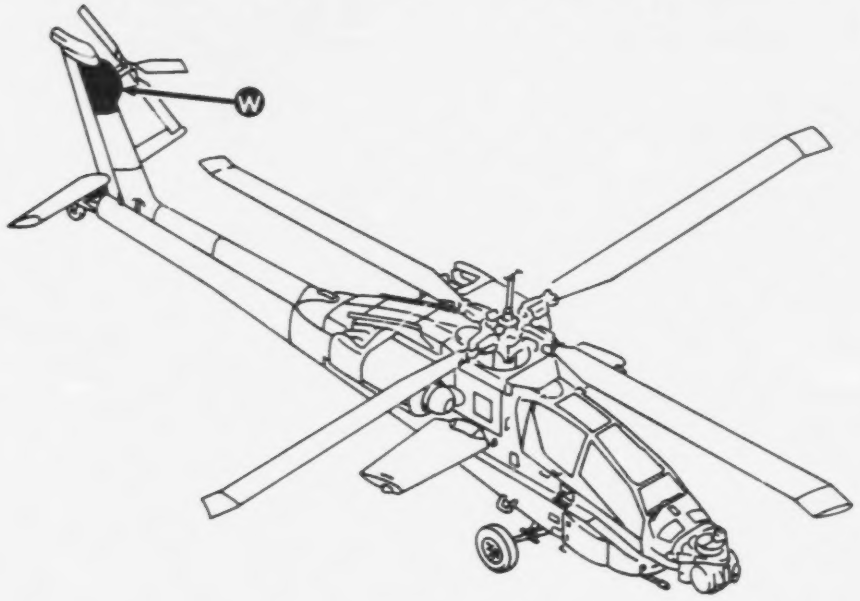
If suspected fault does not apply to flight control system, go to step 34.

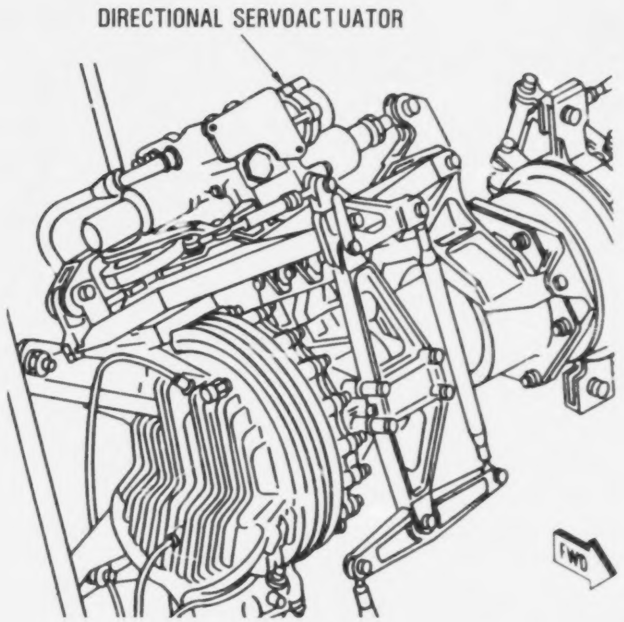
TASK	RESULT
14. Slowly push pilot cyclic stick to full forward position to retract longitudinal servoactuator piston.	
15. Have assistant measure and record actuator stroke. Use inside calipers. Measurement A is from bottom of jam nut to top surface of servoactuator housing (actuator retracted).	
16. Slowly pull pilot cyclic stick to full aft position to extend piston.	
17. Have assistant measure and record actuator stroke. Use inside calipers. Measurement B is from bottom of jam nut to top surface of servoactuator housing (actuator extended).	
18. Subtract measurement A from B. Actuator travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, go to step 34.

TASK	RESULT
19. Slowly pull pilot collective stick to full up position to retract collective servoactuator piston.	
20. Have assistant measure and record actuator stroke. Use inside calipers. Measurement A is from bottom of jam nut to top surface of servoactuator housing (actuator retracted).	
21. Slowly push pilot collective stick to full down position to extend piston.	
22. Have assistant measure and record actuator stroke. Use inside calipers. Measurement B is from bottom of jam nut to top surface of servoactuator housing (actuator extended).	
23. Subtract measurement A from B. Actuator travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, go to step 34.
24. Slowly push pilot cyclic stick to full left position to retract lateral servoactuator piston.	
25. Have assistant measure and record actuator stroke. Use inside calipers. Measurement A is from bottom of of jam nut to top surface of servoactuator housing (actuator retracted).	
26. Slowly pull pilot cyclic stick to full right position to extend piston.	
27. Have assistant measure and record actuator stroke. Use inside calipers. Measurement B is from bottom of jam nut to top surface of servoactuator housing (actuator extended).	

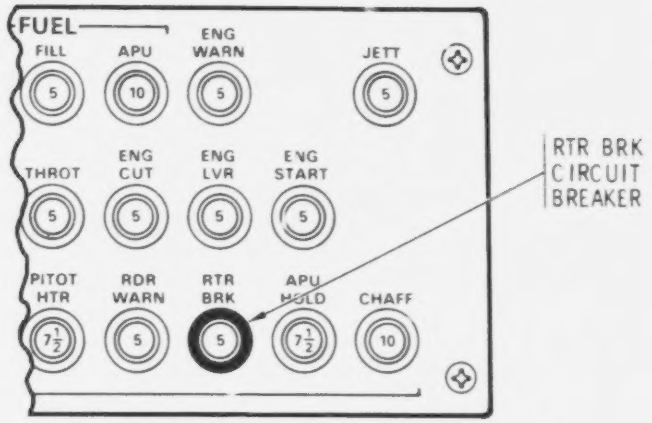
GO TO NEXT PAGE

7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

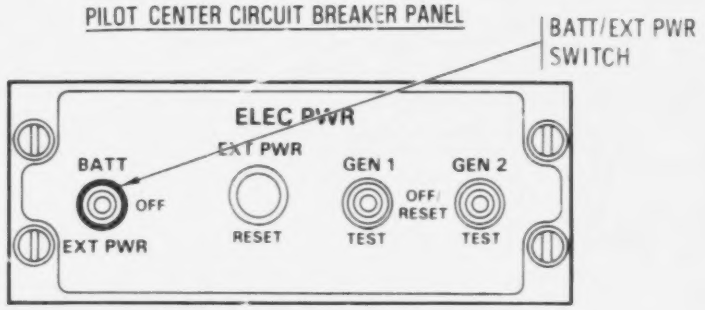



DIRECTIONAL SERVOACTUATOR
FWD

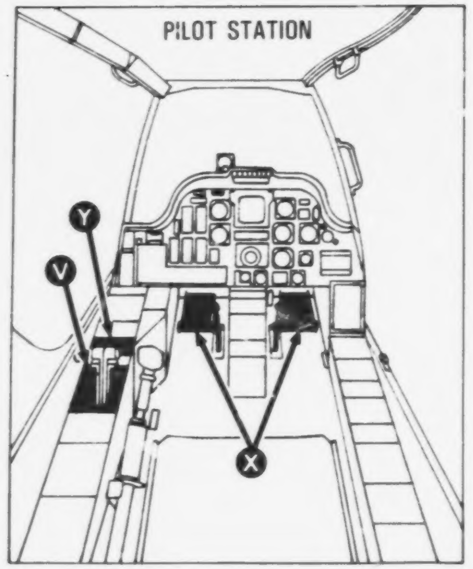
W ACCESS TO DIRECTIONAL SERVOACTUATOR THRU FAIRING L540

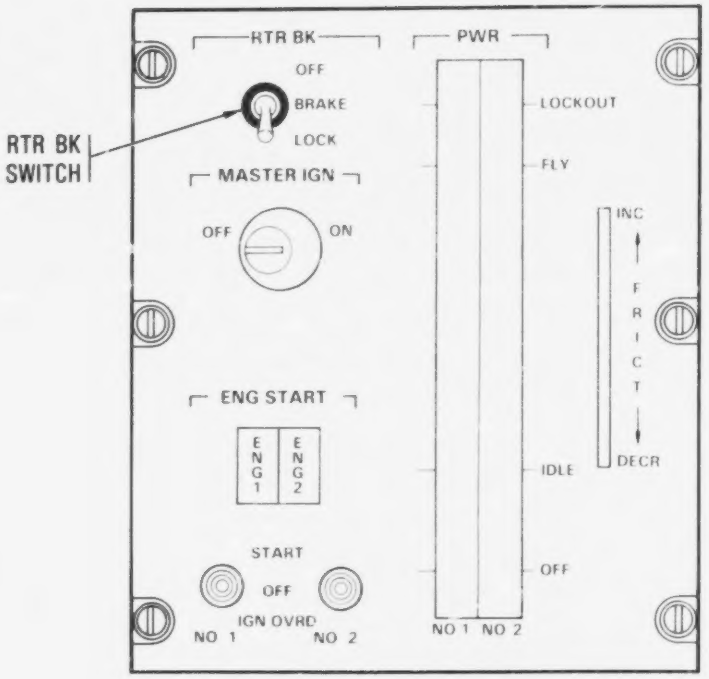

FUEL
FILL
5
APU
10
ENG WARN
5
JETT
5
THROT
5
ENG CUT
5
ENG LVR
5
ENG START
5
PITOT HTR
7½
RDR WARN
5
RTR BRK
5
APU HOLD
7½
CHAFF
10
RTR BRK CIRCUIT BREAKER

PILOT CENTER CIRCUIT BREAKER PANEL

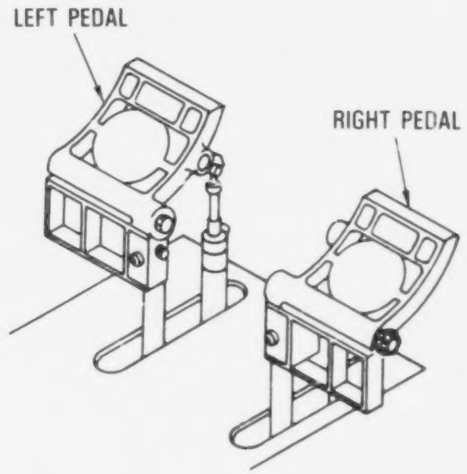

BATT/EXT PWR SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
OFF/RESET
TEST
GEN 2
TEST

Y PILOT ELEC POWER PANEL

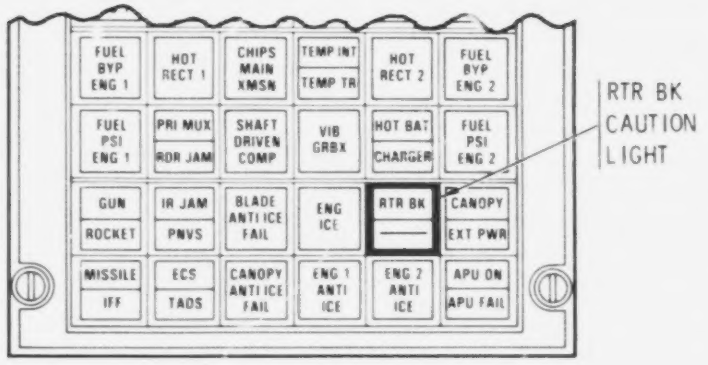

PILOT STATION
Y
V
X


RTR BK SWITCH
RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
PWR
LOCKOUT
FLY
INC
FRICT
DECR
IDLE
OFF
NO 1
NO 2

V PILOT POWER LEVER QUADRANT


LEFT PEDAL
RIGHT PEDAL

X DIRECTIONAL CONTROL PEDALS (TYP)


FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL
RTR BK CAUTION LIGHT

PILOT CAUTION/WARNING PANEL

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GO TO NEXT PAGE

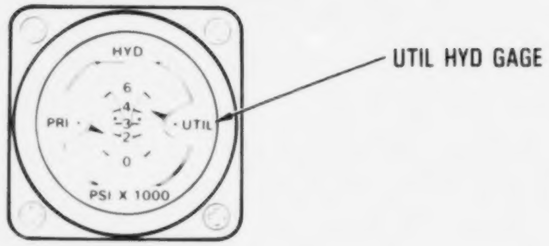
7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

TASK	RESULT
28. Subtract measurement A from B. Actuator travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, go to step 34.
29. Slowly push pilot right pedal to full right position to retract directional servoactuator piston.	
30. Have assistant measure and record actuator stroke with inside calipers. Measurement A is from bottom of the jam nut to top surface of the servoactuator housing (actuator retracted).	
31. Slowly push pilot left pedal to full left position to extend piston.	
32. Have assistant measure and record actuator stroke with inside calipers. Measurement B is from bottom of the jam nut to top surface of the servoactuator housing (actuator extended).	
33. Subtract measurement A from B. Actuator travel is 1.750 to 1.810 inches.	If actuator travels full stroke, go to step 40.1.
34. Check servoactuators for fluid leakage (TM 55-1520-238-23).	If leakage is present, replace leaking servoactuator (TM 55-1520-238-23).
NOTE If all servoactuators strokes are within specified limits, go to step 41.	
35. Disconnect push-pull rod from servoactuator valve arm (TM 55-1520-238-23).	
36. Slowly push servoactuator valve arm upward to fully retract piston.	

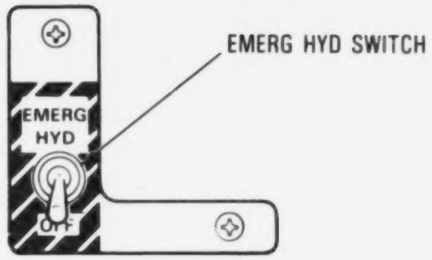
TASK	RESULT
37. Have assistant measure and record actuator stroke with inside calipers. Measurement A is from bottom of the jam nut to top surface of the servoactuator housing (actuator retracted).	
38. Slowly pull servoactuator valve arm downward to fully extend piston.	
39. Have assistant measure and record actuator stroke with inside calipers. Measurement B is from bottom of the jam nut to top surface of the servoactuator housing (actuator extended).	
40. Subtract measurement A from B. Directional actuator travel is 1.750 to 1.810 inches. All other actuators travel is 3.500 to 3.560 inches.	If actuator does not travel full stroke, replace servoactuator (TM 55-1520-238-23). If actuator travels full stroke, perform appropriate flight control system rigging check (TM 55-1520-238-23).
40.1 On pilot center circuit breaker panel, check that **RTR BRK** circuit breaker is closed.	If **RTR BRK** circuit breaker does not stay closed, go to para 7-3-17.
41. Check that **RTR BK** switch located on pilot power quadrant is **OFF**. Hand rotate main rotor blade assembly.	If main rotor blade assembly does not rotate (rotor brake does not release), go to para 7-3-12.
42. On pilot caution/warning panel, check **RTR BK** caution light is off.	If **RTR BK** caution light is on, go to para 7-3-18.
43. To stop blade rotation, set **RTR BK** switch to **BRAKE.**	If rotor brake does not stop rotation of rotor assembly and **RTR BRK** circuit breaker is closed, go to para 7-3-13. If rotor brake does not stop rotation of rotor assembly and **RTR BRK** circuit breaker is open, go to para 7-3-17.
44. On pilot caution/warning panel, check that **RTR BK** caution light is on.	If **RTR BK** caution light is off, go to para 7-3-11.

GO TO NEXT PAGE

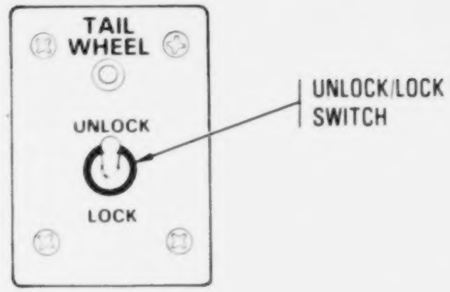
7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)


HYD
6
4
3
2
0
PRI
UTIL
PSI X 1000
UTIL HYD GAGE

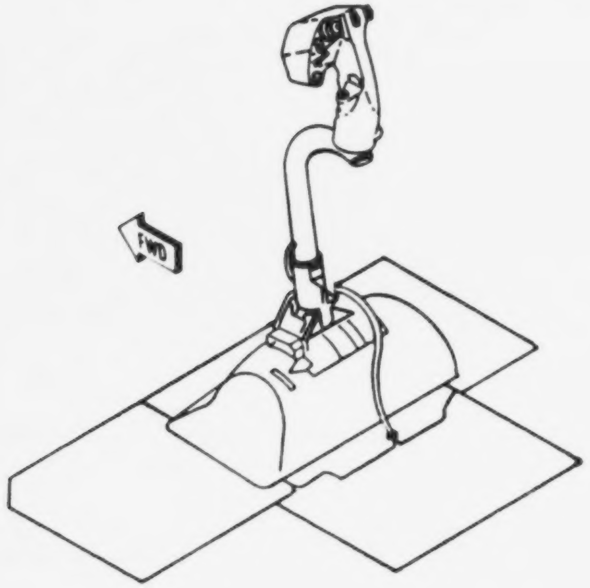
PILOT DUAL HYDRAULIC PRESSURE INDICATOR


EMERG HYD SWITCH
EMERG HYD
OFF

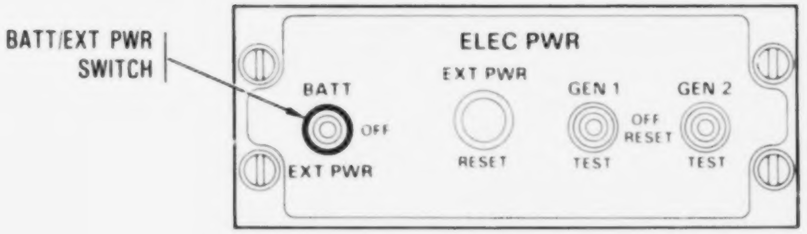
EMERG HYD PANEL


TAIL WHEEL
UNLOCK
LOCK
UNLOCK/LOCK SWITCH

TAIL WHEEL PANEL



PILOT CYCLIC STICK


BATT/EXT PWR SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
OFF RESET
GEN 2
TEST
TEST

PILOT ELEC PWR PANEL

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7-3-1. UTILITY HYDRAULIC SYSTEM - OPERATIONAL CHECK (cont)

TASK	RESULT
45. Disconnect and remove GPU hydraulic pressure from helicopter (TM 55-1520-238-23).	
46. Start helicopter APU (TM 55-1520-238-23).	If APU start sequence does not begin, refer to chapter 15 to troubleshoot APU.
47. On pilot instrument panel, check that dual hydraulic gage indicates 3000 psi on **UTIL**.	If **UTIL** on the dual hydraulic gage does not indicate 3000 psi, go to para 7-3-9.
48. Remove TAIL WHEEL SAFETY FLAG/PIN.	
49. Set **TAIL WHEEL** switch located on pilot instrument panel to **UNLOCK** position.	
50. On pilot instrument panel, check that **TAIL WHEEL** advisory light is lighted.	If **TAIL WHEEL** advisory light does not light, go to para 7-3-14.
51. Check tail wheel lock actuator located above tail wheel. Actuator retracts when tail wheel lock switch is in **UNLOCK** position.	If tail wheel lock actuator does not unlock tail wheel and **TWHL LOCK** circuit breaker is closed, go to para 7-3-15. If **TWHL LOCK** circuit breaker is open, go to para 7-3-19.
52. Insert TAIL WHEEL SAFETY FLAG/PIN.	
53. Shutdown APU (TM 55-1520-238-23).	
54. On pilot instrument panel, set **EMERG HYD** switch to **EMERG HYD** position. Check **UTIL ACC PSI** gage for 3000 psi steady indication.	If **UTIL ACC PSI** gage does not indicate 3000 psi and **EMERG HYD** circuit breaker is closed, go to para 7-3-20. If **EMERG HYD** circuit breaker is open, go to para 7-3-16.

TASK	RESULT
55. Exercise pilot cyclic stick. Track stick motion with hydraulic servoactuator movements to verify proper emergency hydraulic flight controls operation.	If emergency hydraulic flight controls do not operate properly and **EMERG HYD** circuit breaker is closed, go to para 7-3-10. If emergency hydraulic flight controls do not operate properly and **EMERG HYD** circuit breaker is open, go to para 7-3-16.
56. On pilot instrument panel, set **EMERG HYD** switch to **OFF**.	
57. On pilot power quadrant, check that **ENG 1** and **ENG 2** power levers are in **OFF** position	
58. Service utility hydraulic reservoir, if required (TM 55-1520-238-23).	

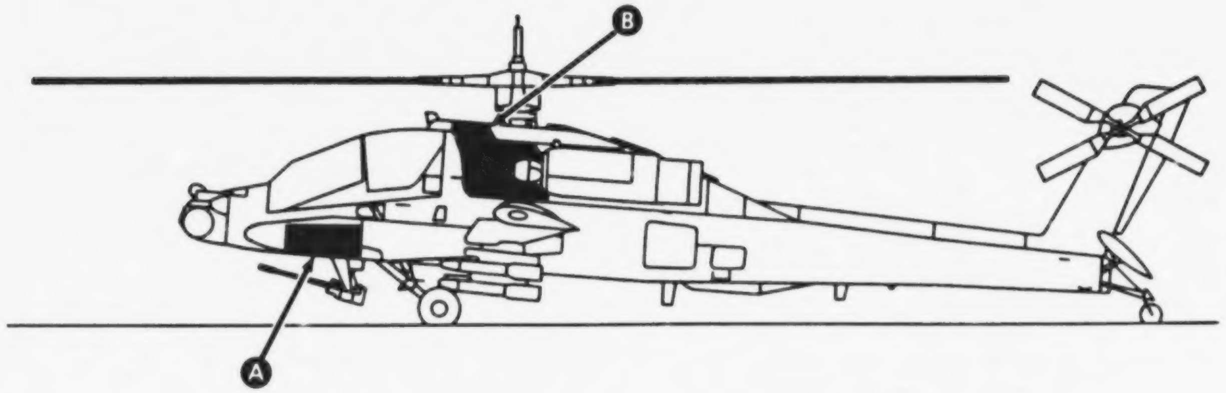
I. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **OFF**.

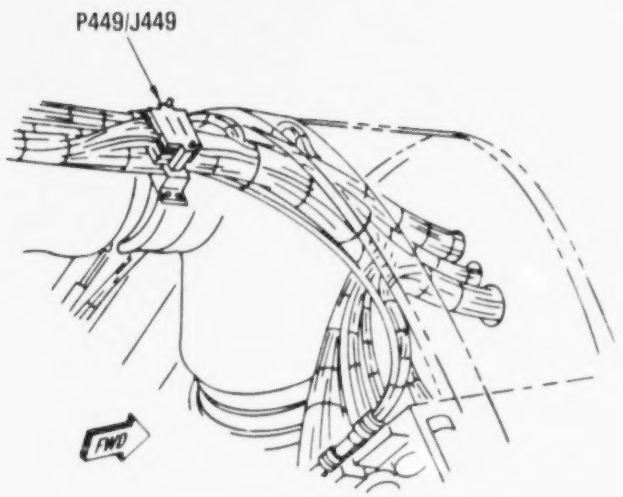
J. Remove external electrical and hydraulic (utility) power application (TM 55-1520-238-23).

K. Close and secure all access panels and doors opened during this operational check (TM 55-1520-238-23).

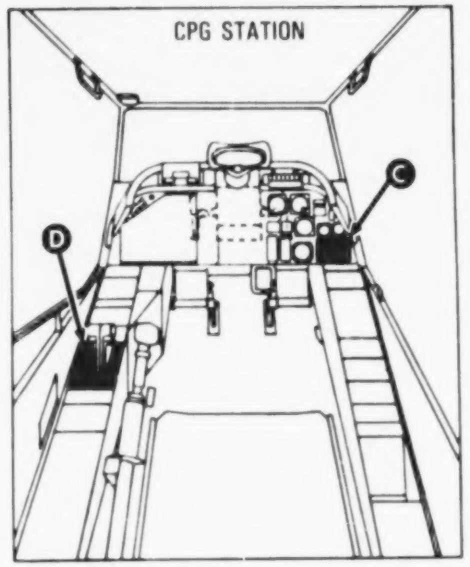
END OF TASK

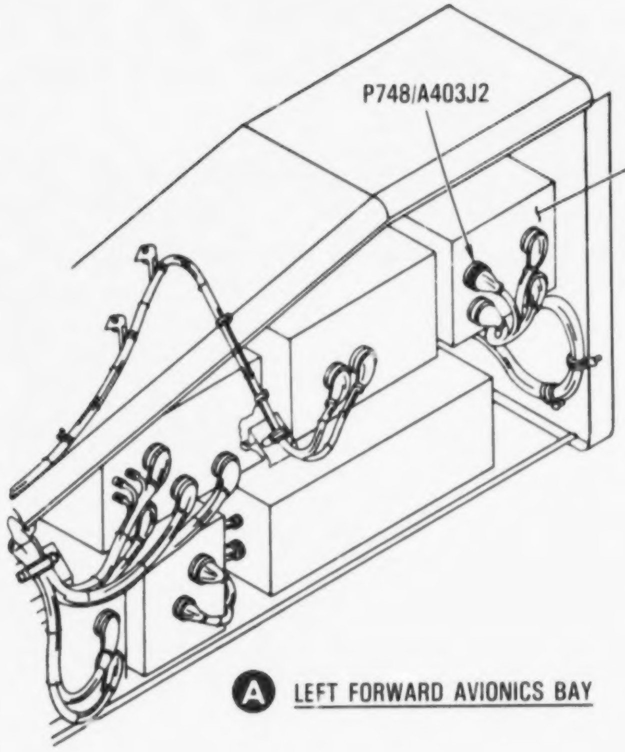
7-3-2. UTILITY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION



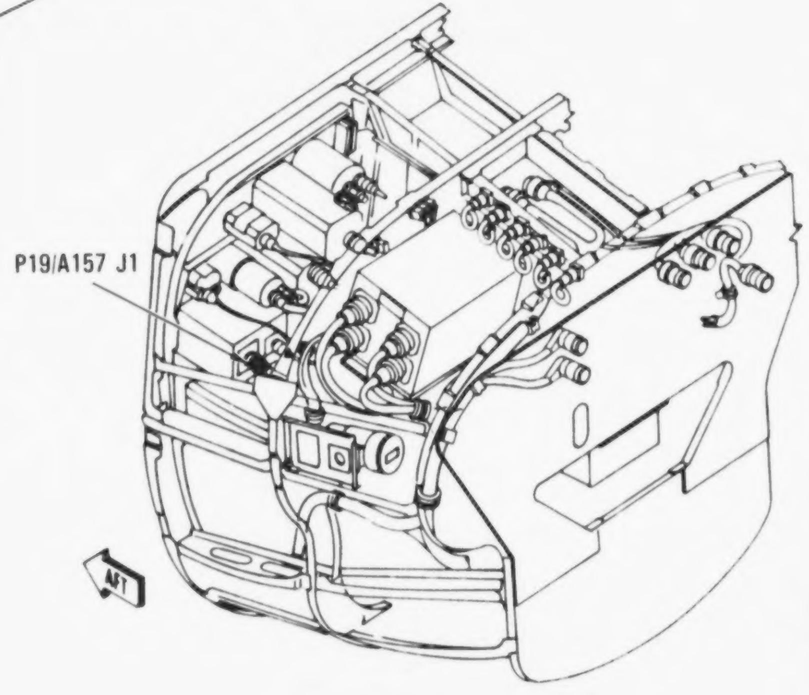

P449/J449
FWD

B LEFT MAIN DECK

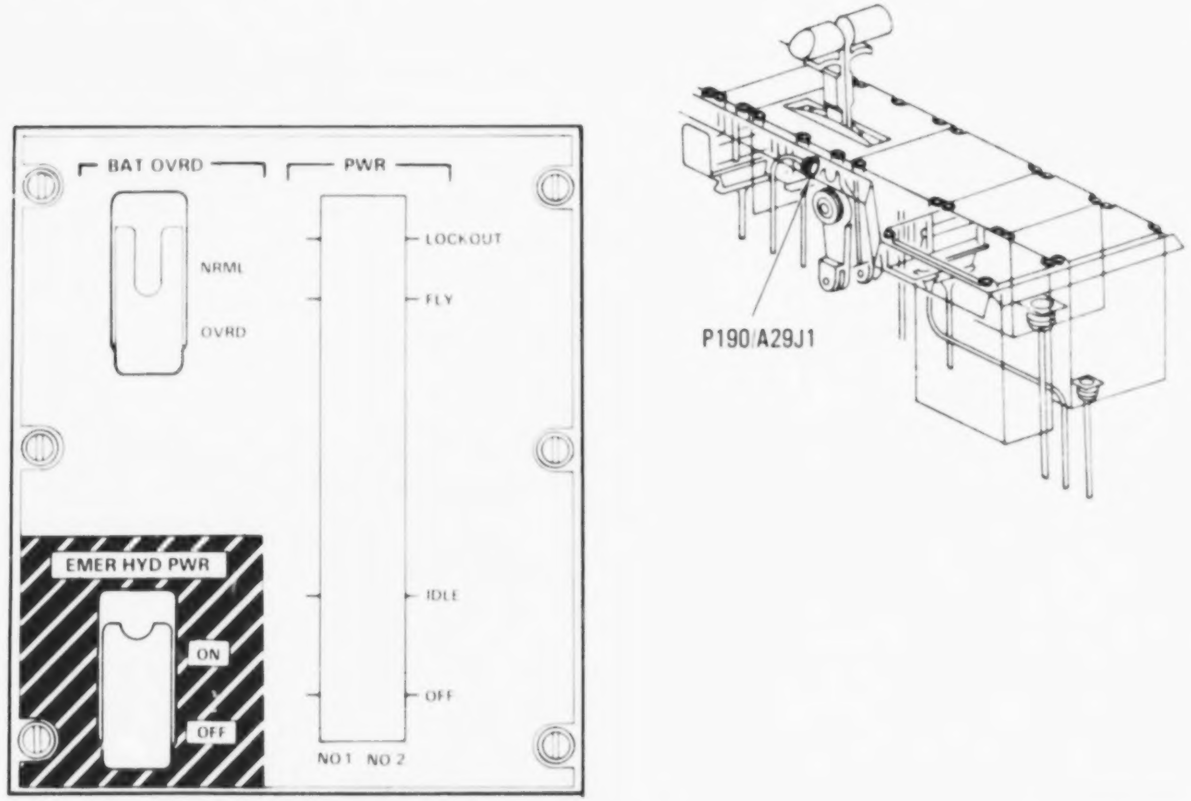

CPG STATION
C
D


P748/A403J2
MULTI CHANNEL DIMMER CONTROLLER

A LEFT FORWARD AVIONICS BAY


P19/A157 J1
AFT

C CPG CAUTION/WARNING PANEL


BAT OVRD
NRML
OVRD
PWR
LOCKOUT
FLY
IDLE
OFF
NO 1
NO 2
EMER HYD PWR
ON
OFF
P190/A29J1

D CPG POWER QUADRANT

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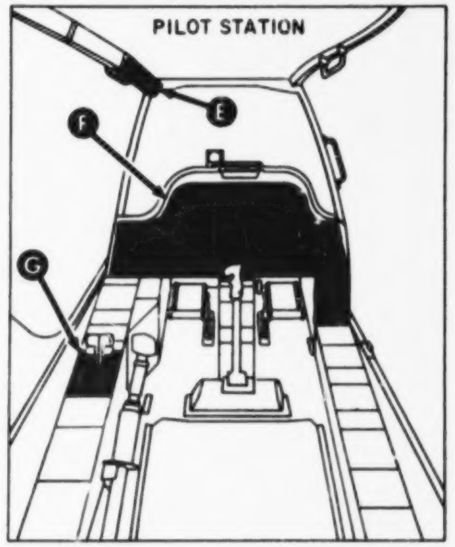
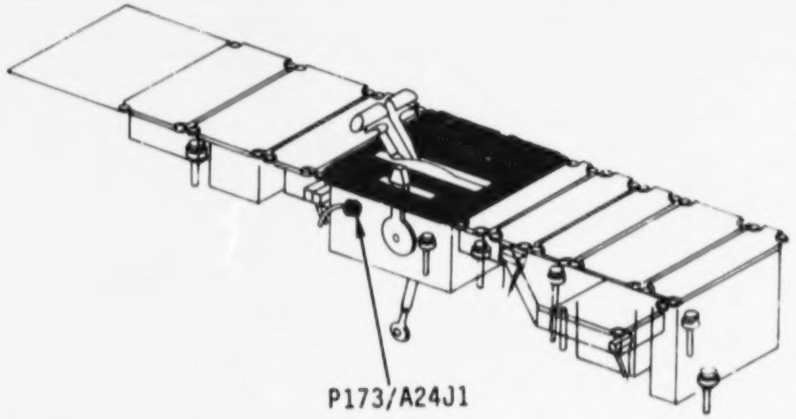
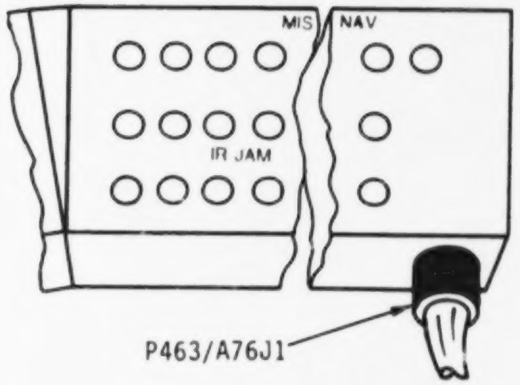
7-3-2. UTILITY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

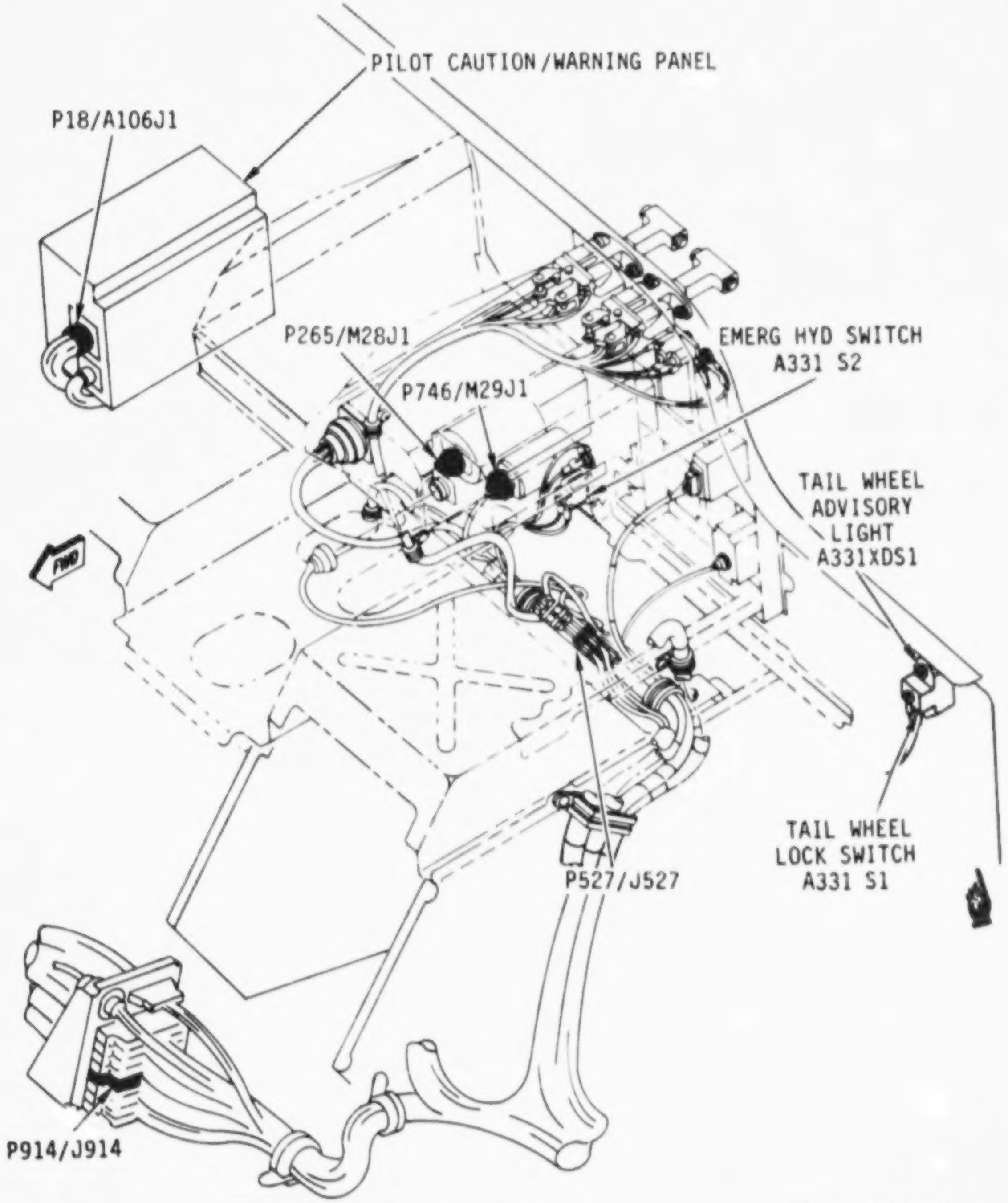

PILOT STATION
E
F
G



Ⓖ PILCT POWER QUADRANT


MIS
NAV
IR JAM
P463/A76J1

Ⓔ PILOT FORWARD CIRCUIT BREAKER PANEL


PILOT CAUTION/WARNING PANEL
P18/A106J1
P265/M28J1
P746/M29J1
EMERG HYD SWITCH A331 S2
TAIL WHEEL ADVISORY LIGHT A331XDS1
FWD
P527/J527
TAIL WHEEL LOCK SWITCH A331 S1
P914/J914

Ⓕ PILOT INSTRUMENT PANEL

MM04/1-773-2C

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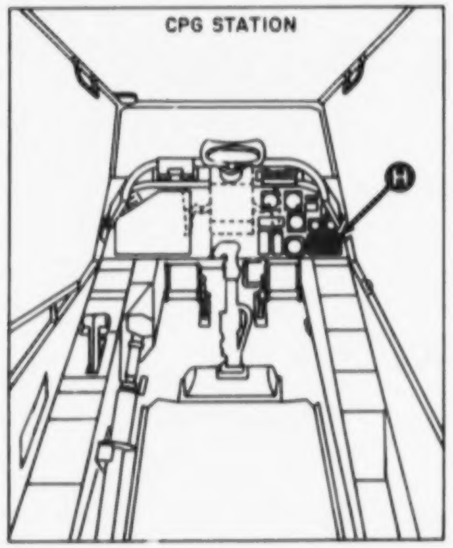
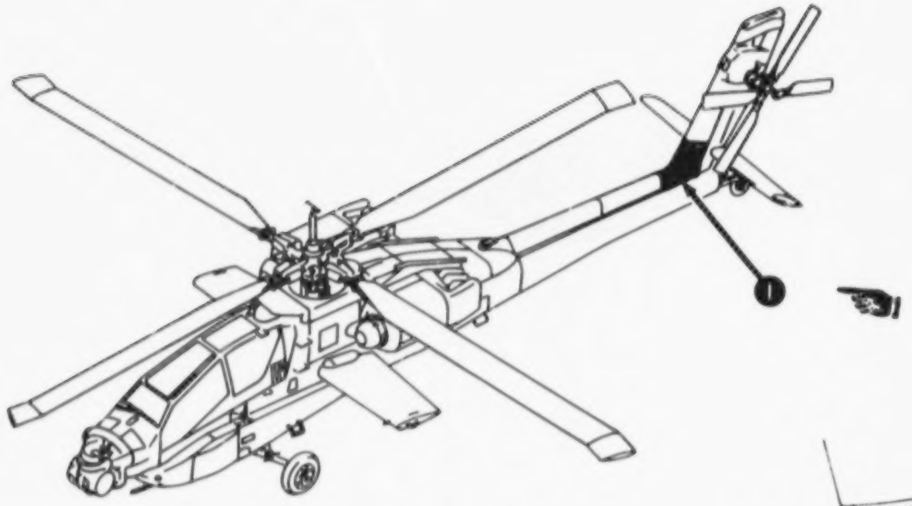
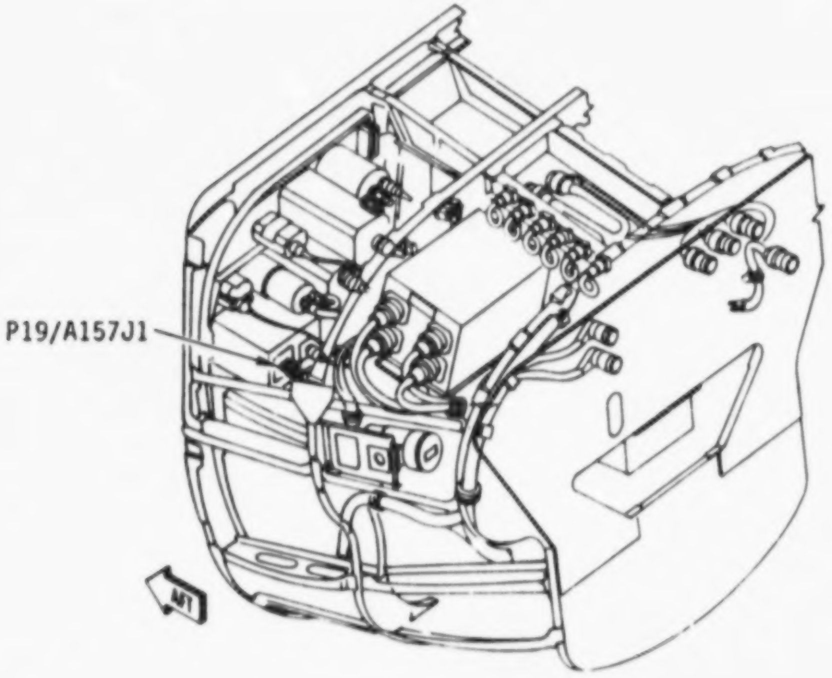
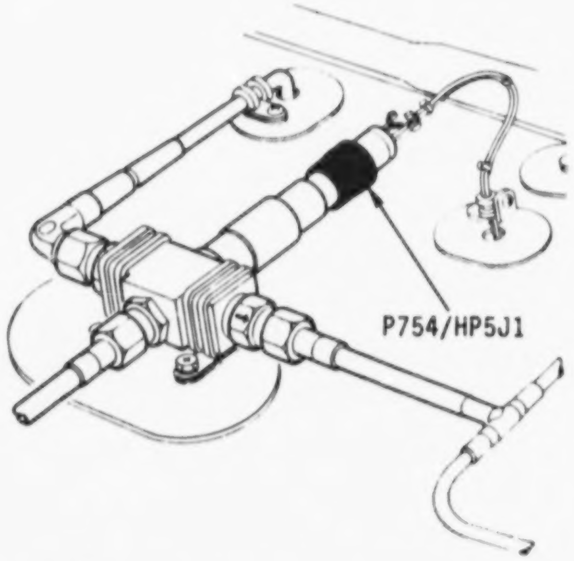
7-3-2. UTILITY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


CPG STATION
H

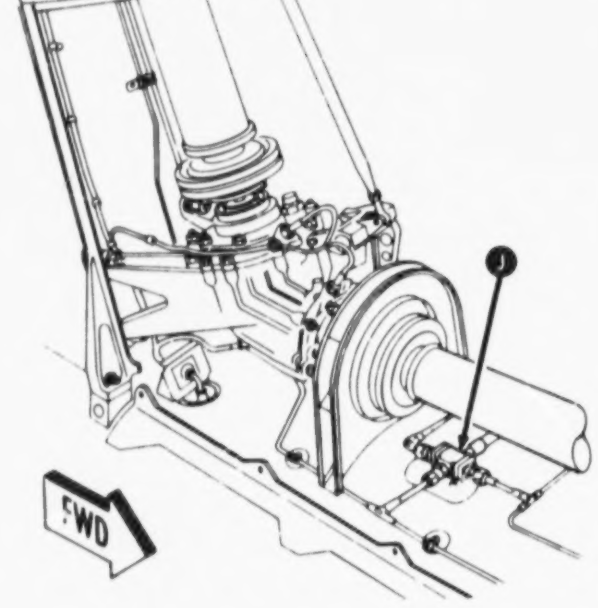



P19/A157J1
AFT

H CPG CAUTION / WARNING PANEL



J TAIL WHEEL LOCK CONTROL VALVE



I AFT FUSELAGE

MM04/1-773-3C

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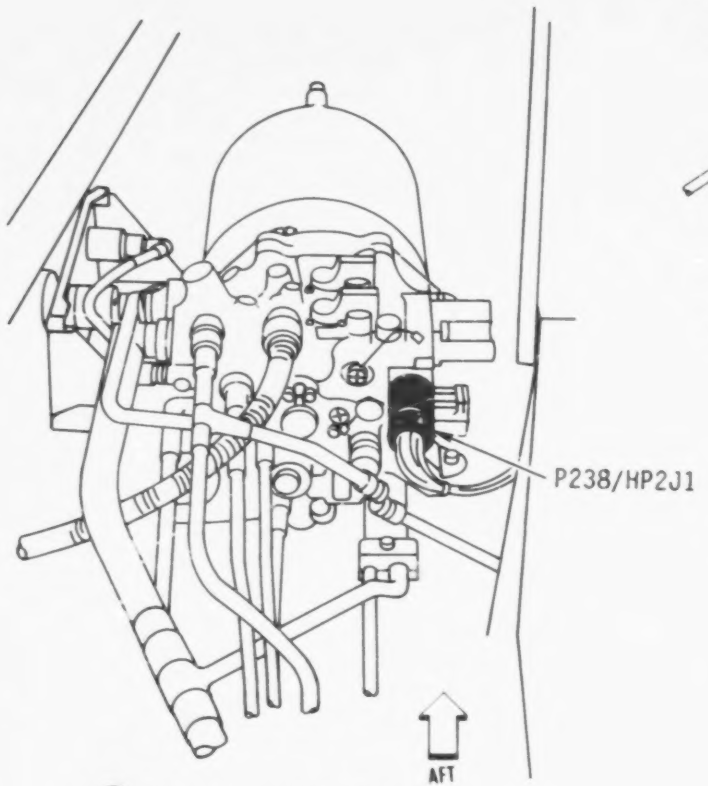
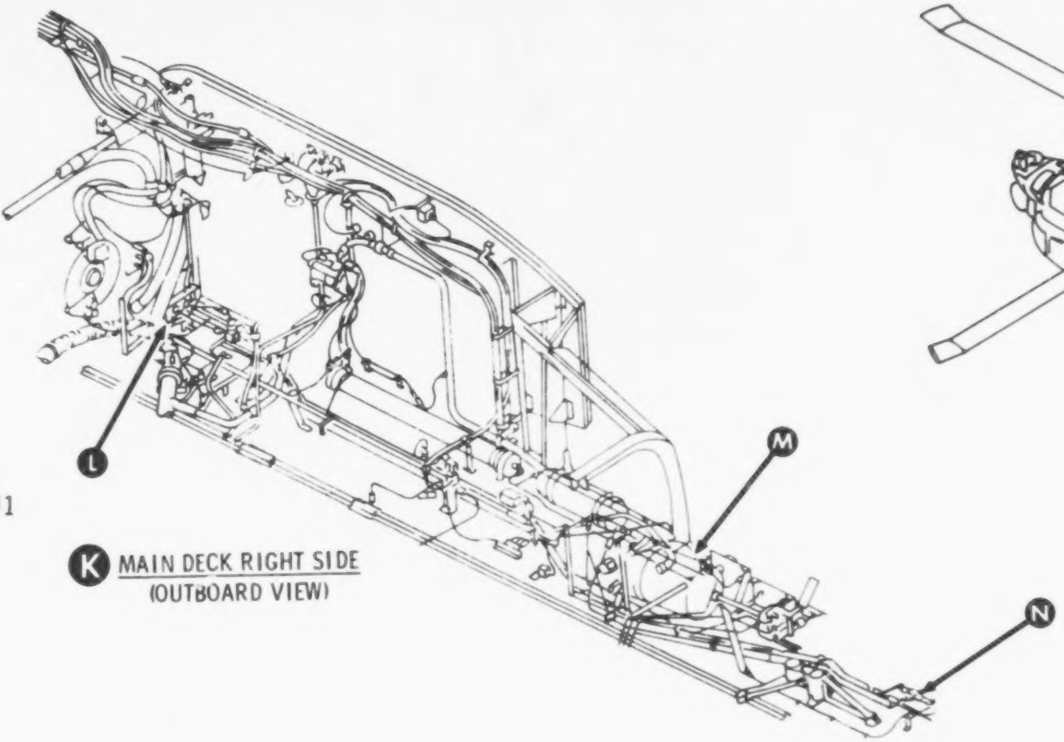
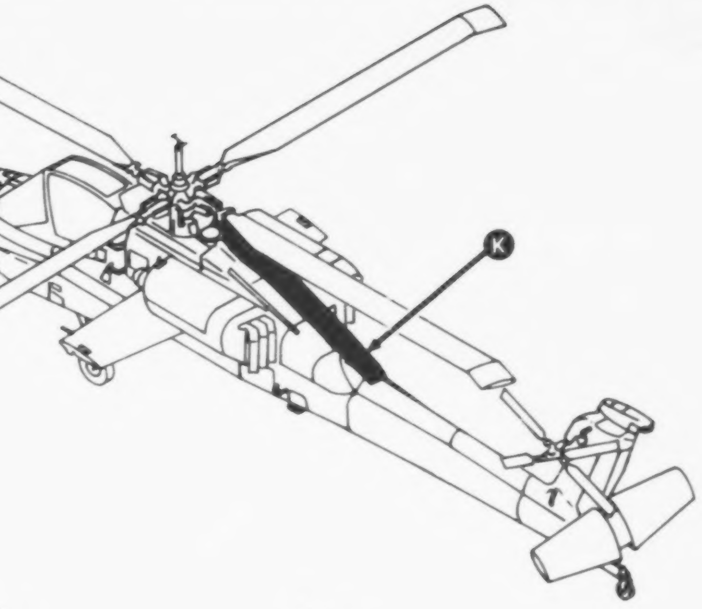
7-3-2. UTILITY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

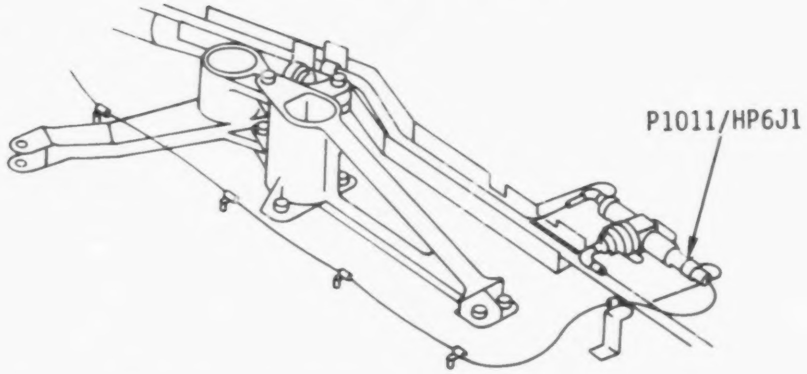

P238/HP2J1
AFT

M UTILITY HYDRAULIC MANIFOLD

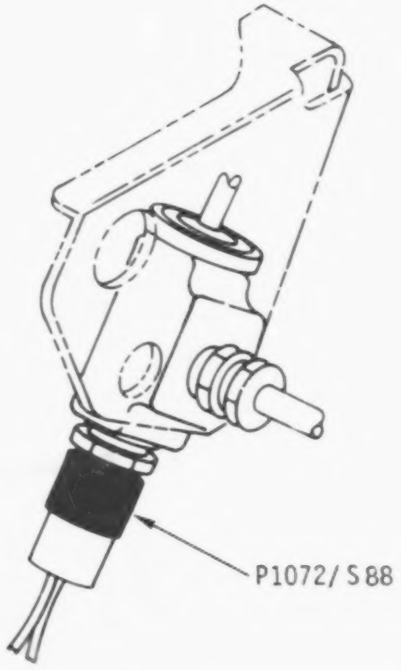


K MAIN DECK RIGHT SIDE (OUTBOARD VIEW)




P1011/HP6J1

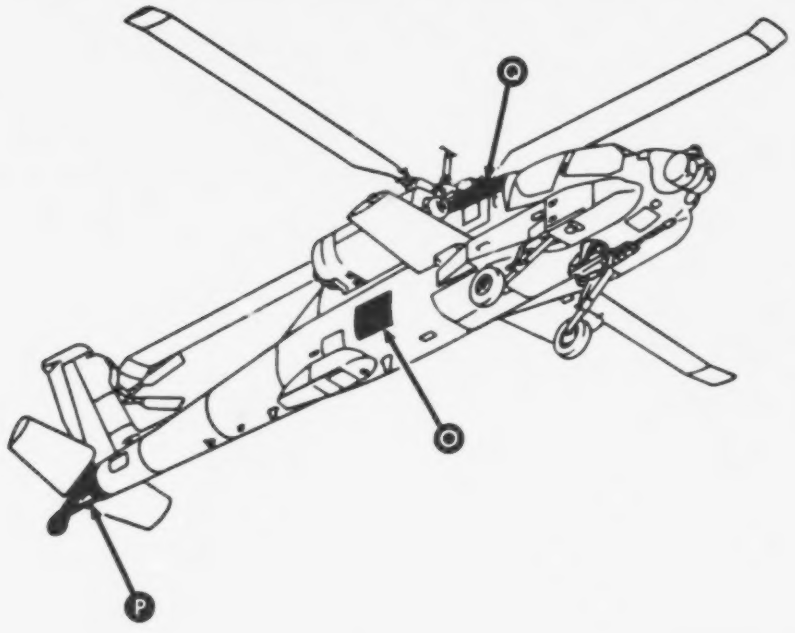
N UTILITY HYDRAULIC SHUT OFF VALVE

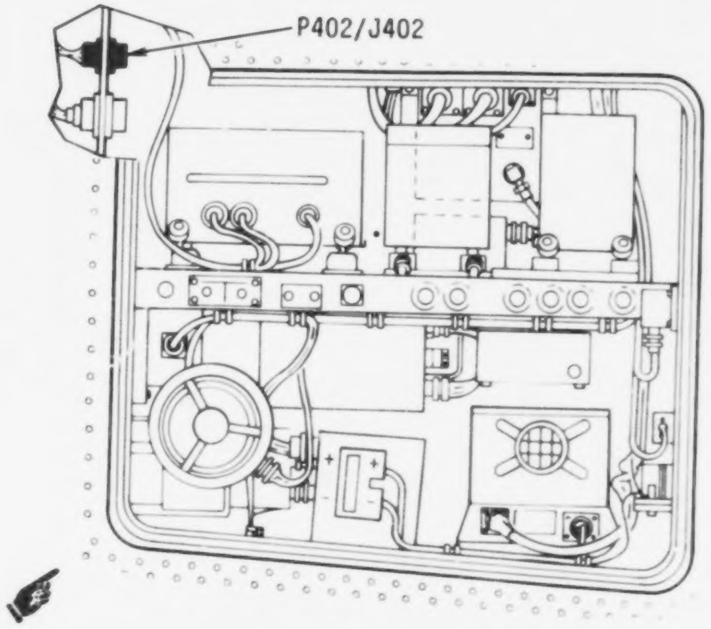


L ROTOR BRAKE PRESSURE SWITCH

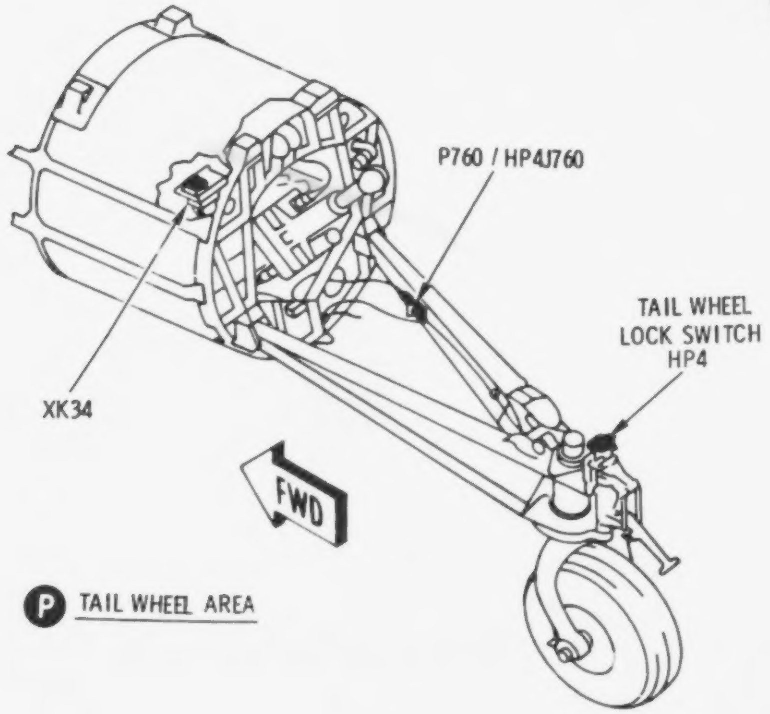
MM04/1-773-4B

7-3-2. UTILITY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)

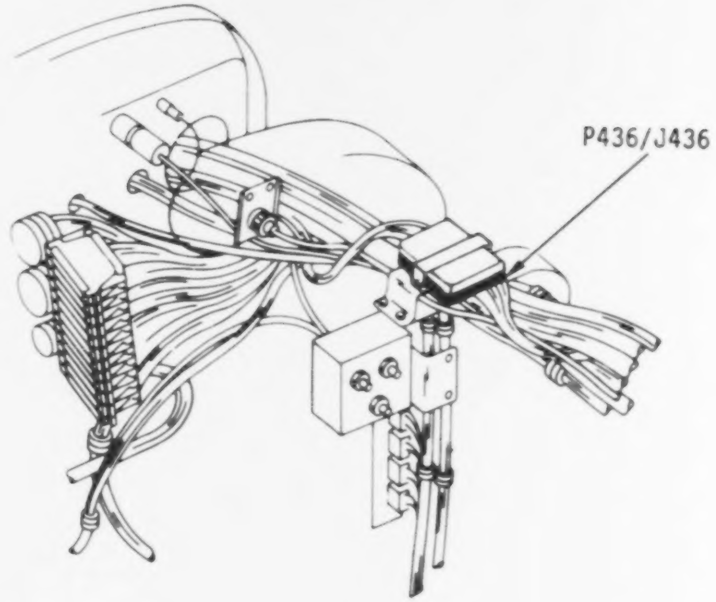




Ⓞ AFT AVIONICS BAY


P760 / HP4J760
TAIL WHEEL LOCK SWITCH HP4
XK34
FWD

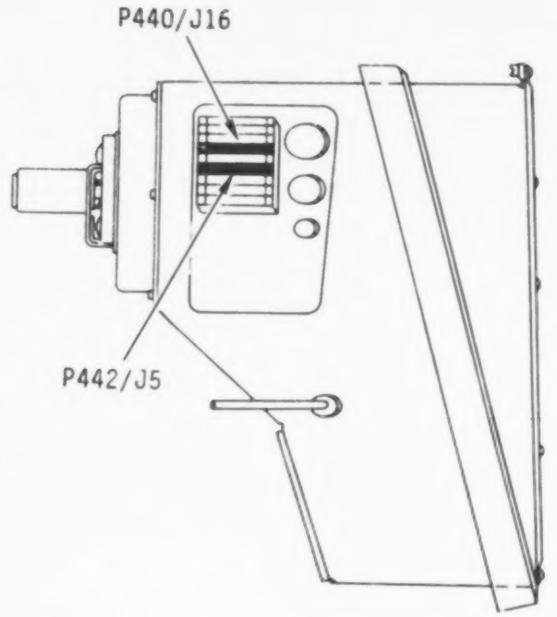
Ⓟ TAIL WHEEL AREA



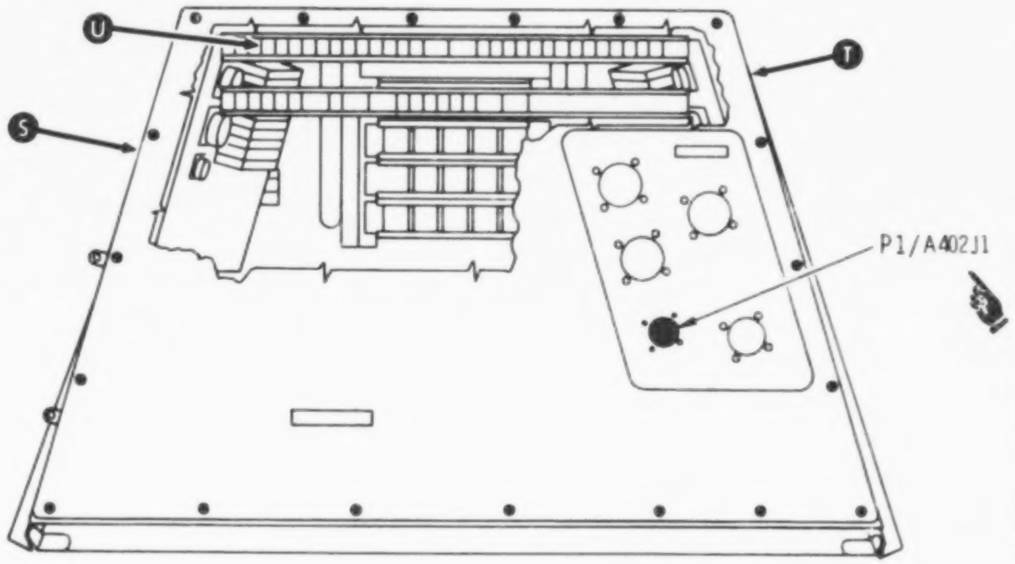
Ⓠ RIGHT MAIN DECK

MM04/1-773-5A

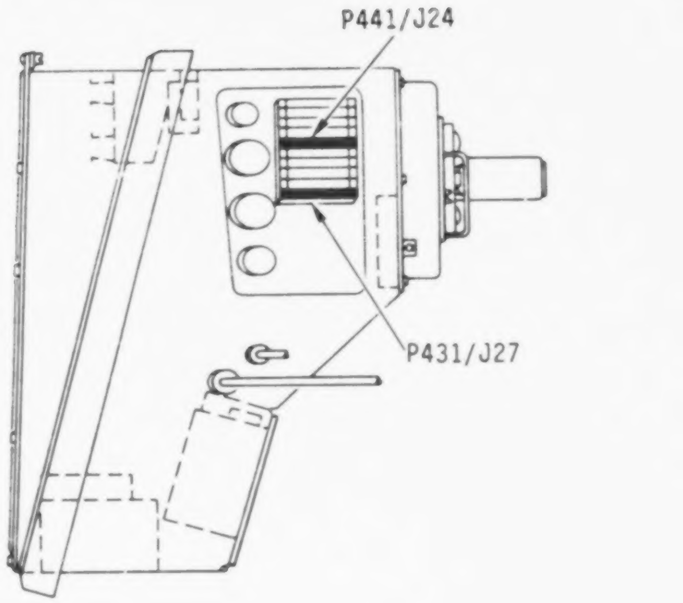
7-3-2. UTILITY HYDRAULIC SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


P440/J16
P442/J5

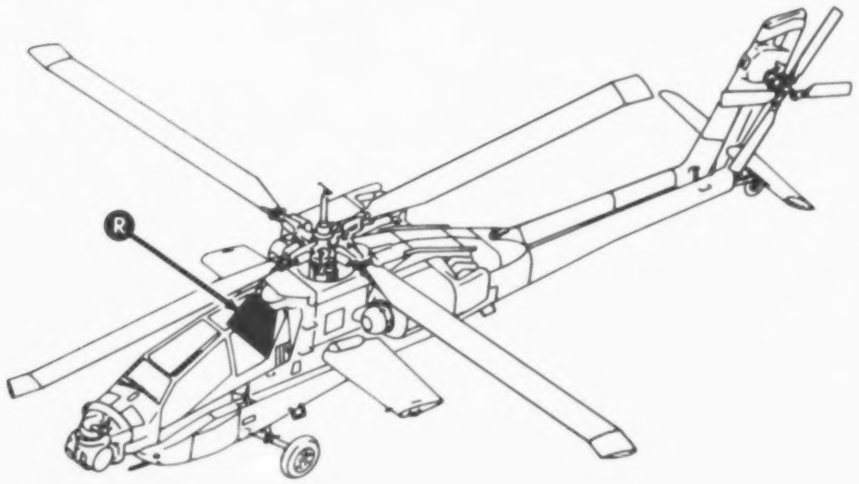
Ⓢ ELECTRICAL POWER DISTRIBUTION BOX RIGHT SIDE

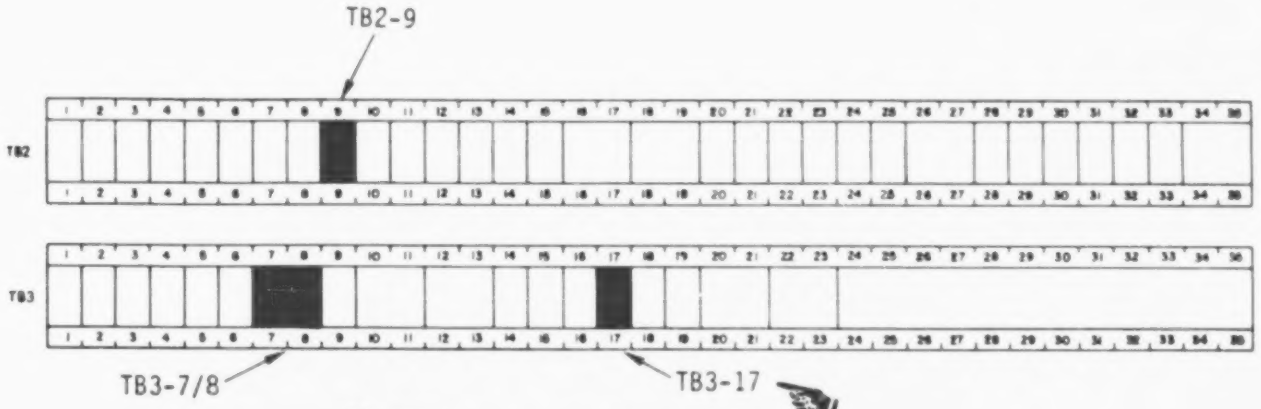


Ⓡ ELECTRICAL POWER DISTRIBUTION BOX (AFT VIEW)


P441/J24
P431/J27

Ⓣ ELECTRICAL POWER DISTRIBUTION BOX LEFT SIDE




TB2-9
TB2
TB3
TB3-7/8
TB3-17

Ⓤ TERMINAL BOARD (FORWARD VIEW)

MM04/1-773-6B

7-3-3. UTIL HYD GAGE DOES NOT INDICATE 3000 PSI (GPU OPERATING)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

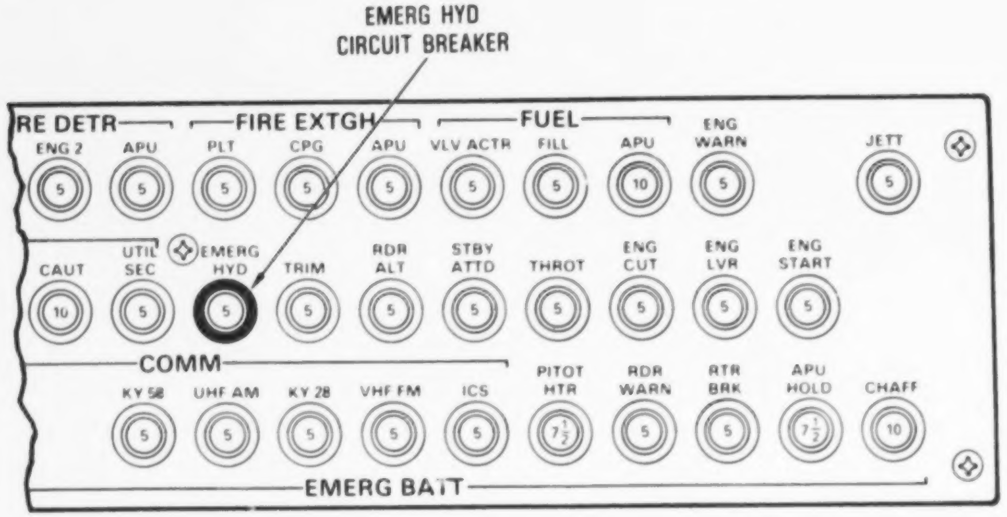
TM 55 1520-238-23

Equipment Conditions:

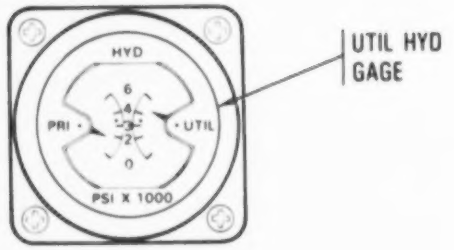
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (utility)
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


EMERG HYD
CIRCUIT BREAKER
RE DETR
FIRE EXTGH
FUEL
ENG 2
APU
PLT
CPG
APU
VLV ACTR
FILL
APU
ENG WARN
JETT
CAUT
UTIL SEC
EMERG HYD
TRIM
RDR ALT
STBY ATTD
THROT
ENG CUT
ENG LVR
ENG START
COMM
KY 58
UHF AM
KY 28
VHF FM
ICS
PITOT HTR
RDR WARN
RTR BRK
APU HOLD
CHAFF
5
10
7½
EMERG BATT

PILOT CENTER CIRCUIT BREAKER PANEL

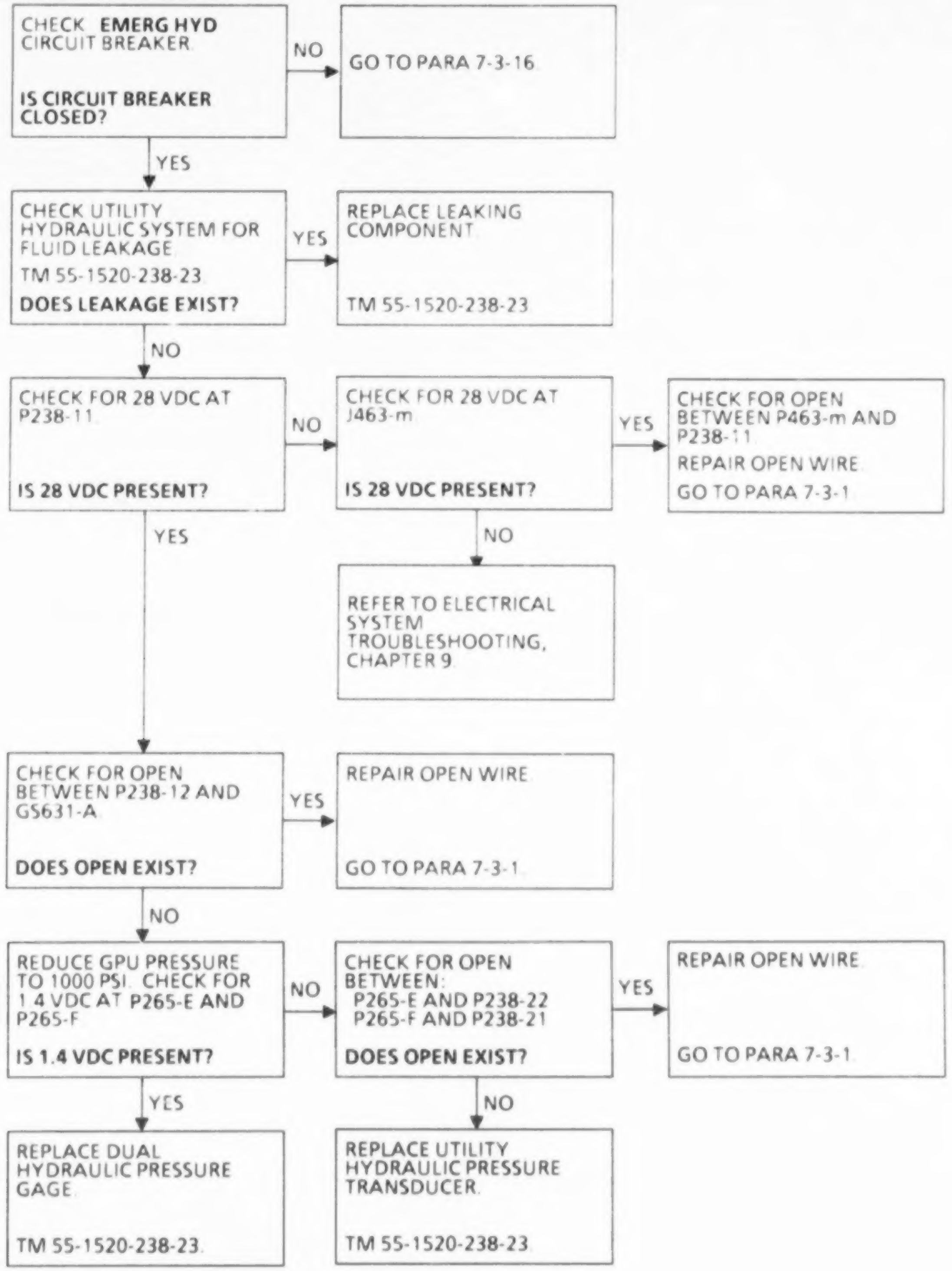

UTIL HYD
GAGE
HYD
PRI
UTIL
6
4
3
2
0
PSI X 1000

PILOT DUAL HYDRAULIC PRESSURE INDICATOR

MM04/1-711

GO TO NEXT PAGE

7-3-3. UTIL HYD GAGE DOES NOT INDICATE 3000 PSI (GPU OPERATING) (cont)


CHECK EMERG HYD CIRCUIT BREAKER.
IS CIRCUIT BREAKER CLOSED?
NO
GO TO PARA 7-3-16.
YES
CHECK UTILITY HYDRAULIC SYSTEM FOR FLUID LEAKAGE.
TM 55-1520-238-23.
DOES LEAKAGE EXIST?
YES
REPLACE LEAKING COMPONENT.
TM 55-1520-238-23.
NO
CHECK FOR 28 VDC AT P238-11.
IS 28 VDC PRESENT?
NO
CHECK FOR 28 VDC AT J463-m.
IS 28 VDC PRESENT?
YES
CHECK FOR OPEN BETWEEN P463-m AND P238-11.
REPAIR OPEN WIRE.
GO TO PARA 7-3-1.
NO
REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.
YES
CHECK FOR OPEN BETWEEN P238-12 AND GS631-A.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 7-3-1.
NO
REDUCE GPU PRESSURE TO 1000 PSI. CHECK FOR 1.4 VDC AT P265-E AND P265-F.
IS 1.4 VDC PRESENT?
NO
CHECK FOR OPEN BETWEEN: P265-E AND P238-22 P265-F AND P238-21
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 7-3-1.
YES
REPLACE DUAL HYDRAULIC PRESSURE GAGE.
TM 55-1520-238-23.
NO
REPLACE UTILITY HYDRAULIC PRESSURE TRANSDUCER.
TM 55-1520-238-23.

END OF TASK

7-3-4. HYDRAULIC HAND PUMP DOES NOT SERVICE UTIL HYD MANIFOLD RESERVOIR

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Service Unit Hydraulic Fluid	1730-00-102-8665

Personnel Required:

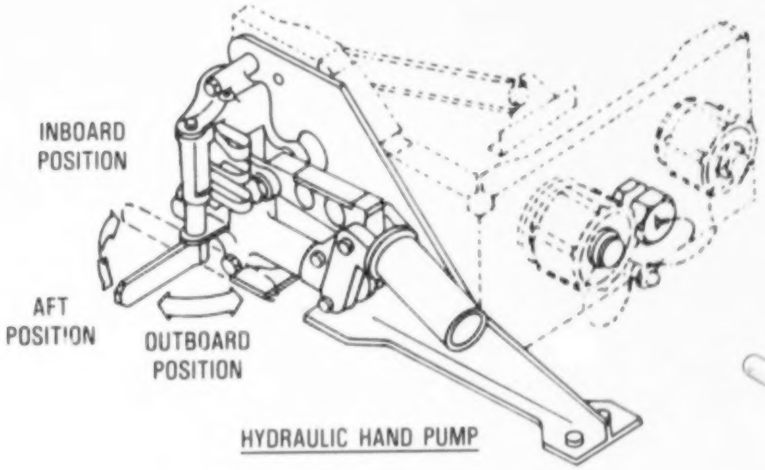
67R10 Attack Helicopter Repairer

References:

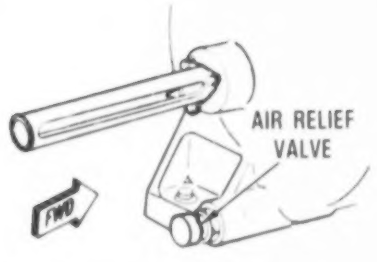
TM 55-1520-238-23

Equipment Conditions:

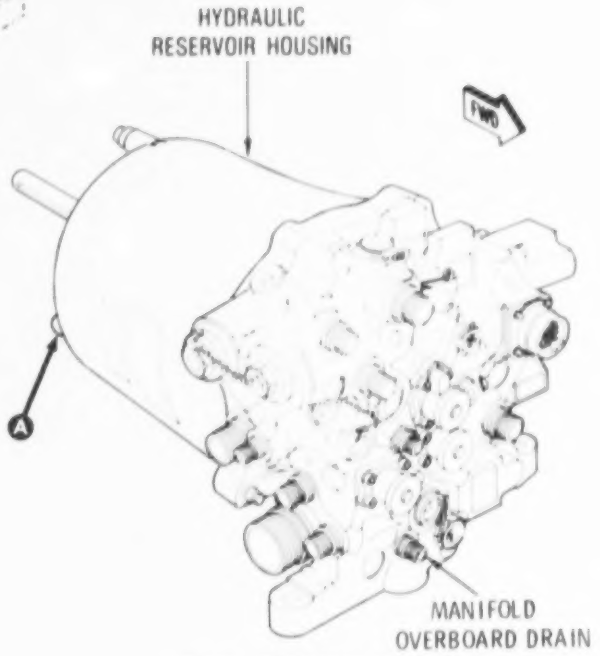
Ref	Condition
TM 55-1520-238-23	Helicopter safed


INBOARD POSITION
AFT POSITION
OUTBOARD POSITION

HYDRAULIC HAND PUMP

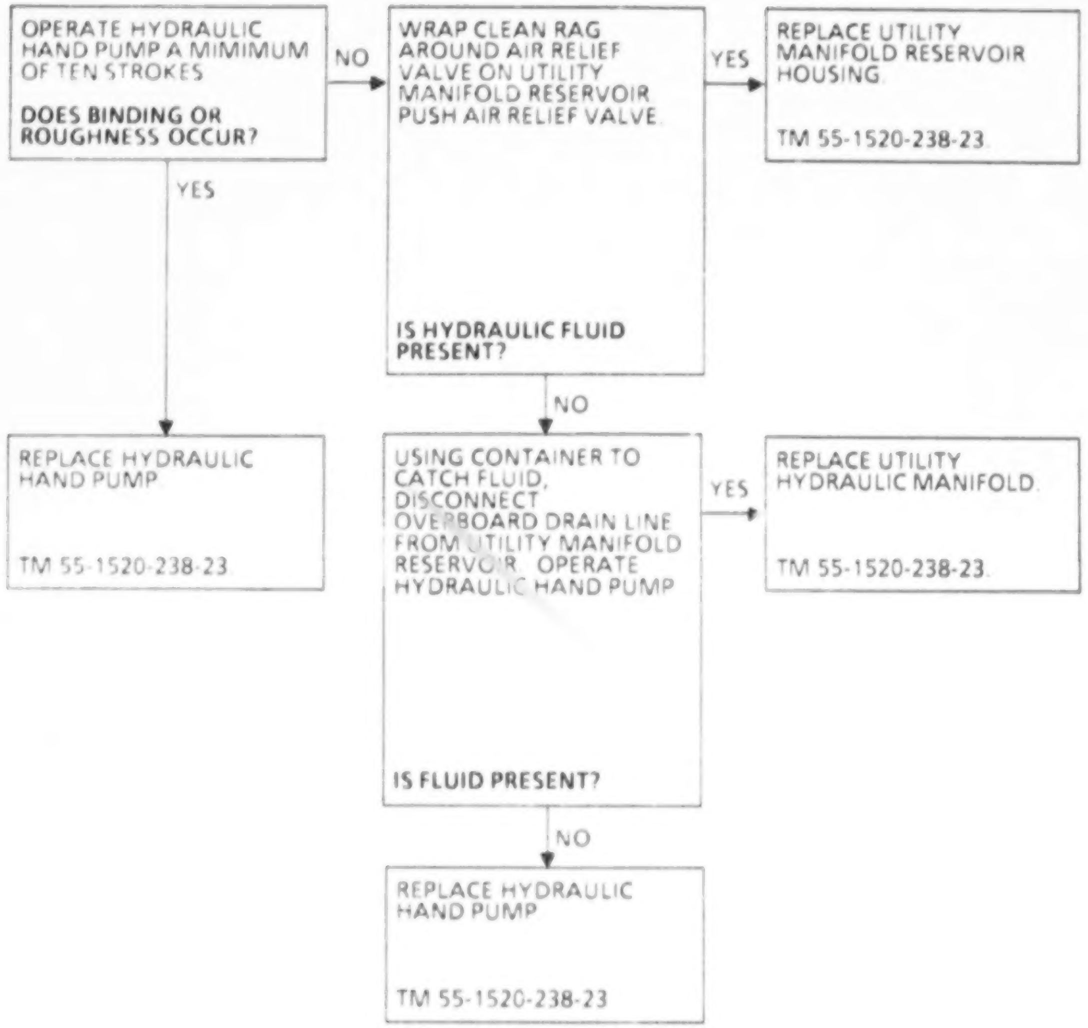

AIR RELIEF VALVE
FWD

Ⓐ AIR RELIEF VALVE LOCATION


HYDRAULIC RESERVOIR HOUSING
FWD
A
MANIFOLD OVERBOARD DRAIN

UTILITY HYDRAULIC MANIFOLD

MM04/1-712


NO
YES
YES
NO
YES
NO

OPERATE HYDRAULIC HAND PUMP A MIMIMUM OF TEN STROKES

DOES BINDING OR ROUGHNESS OCCUR?

WRAP CLEAN RAG AROUND AIR RELIEF VALVE ON UTILITY MANIFOLD RESERVOIR. PUSH AIR RELIEF VALVE.

IS HYDRAULIC FLUID PRESENT?

REPLACE UTILITY MANIFOLD RESERVOIR HOUSING.

TM 55-1520-238-23.

REPLACE HYDRAULIC HAND PUMP.

TM 55-1520-238-23.

USING CONTAINER TO CATCH FLUID, DISCONNECT OVERBOARD DRAIN LINE FROM UTILITY MANIFOLD RESERVOIR. OPERATE HYDRAULIC HAND PUMP.

IS FLUID PRESENT?

REPLACE UTILITY HYDRAULIC MANIFOLD.

TM 55-1520-238-23.

REPLACE HYDRAULIC HAND PUMP.

TM 55-1520-238-23

END OF TASK

7-3-5. UTIL HYD PSI INDICATOR IS LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

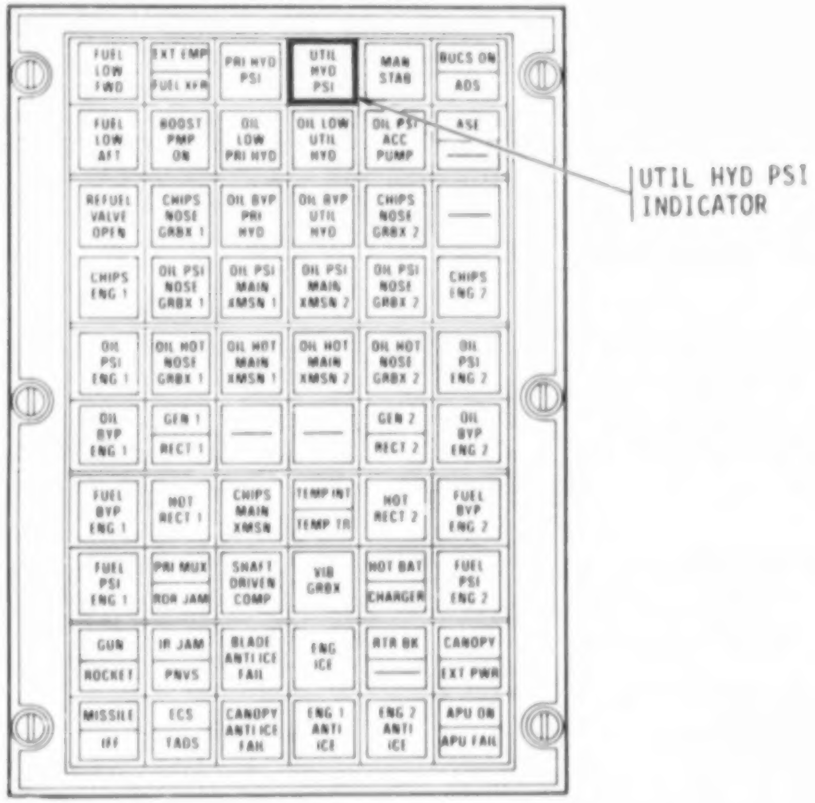
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

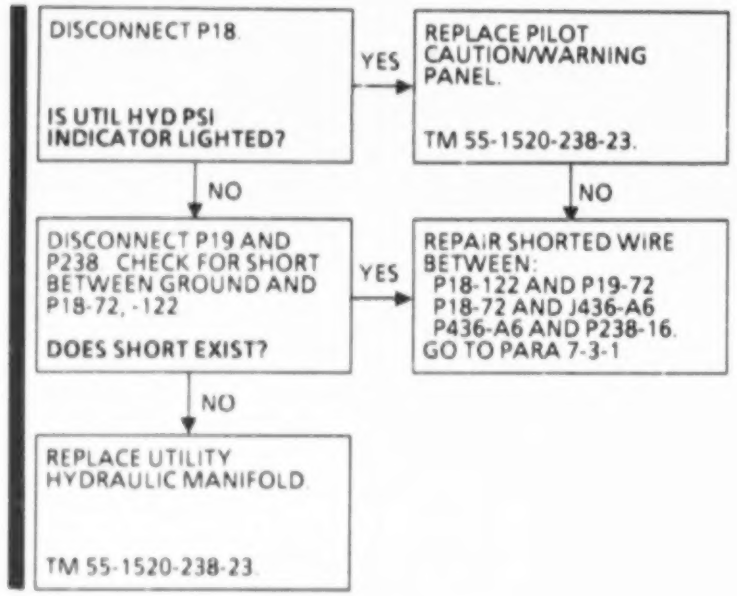
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Hydraulic system leak check-completed



PILOT CAUTION WARNING PANEL

MM04/1-713A



DISCONNECT P18.

IS UTIL HYD PSI INDICATOR LIGHTED?

YES: REPLACE PILOT CAUTION/WARNING PANEL. TM 55-1520-238-23.

NO: DISCONNECT P19 AND P238. CHECK FOR SHORT BETWEEN GROUND AND P18-72, -122.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN: P18-122 AND P19-72 P18-72 AND J436-A6 P436-A6 AND P238-16. GO TO PARA 7-3-1

NO: REPLACE UTILITY HYDRAULIC MANIFOLD. TM 55-1520-238-23.

END OF TASK

7-3-6. OIL LOW UTIL HYD CAUTION LIGHT IS ON

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit Electrical Repairer's	5180-00-323-4915
Service Unit, Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

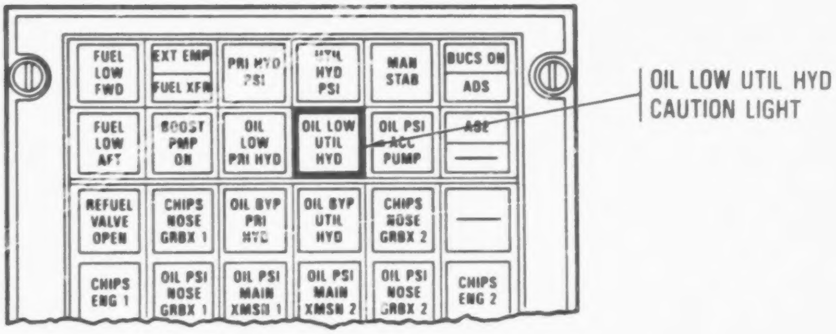
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical - Hydraulic (utili Access provisions - L325 door; T290R, T290L fairings remov
Para 1-3-2	ICS connected

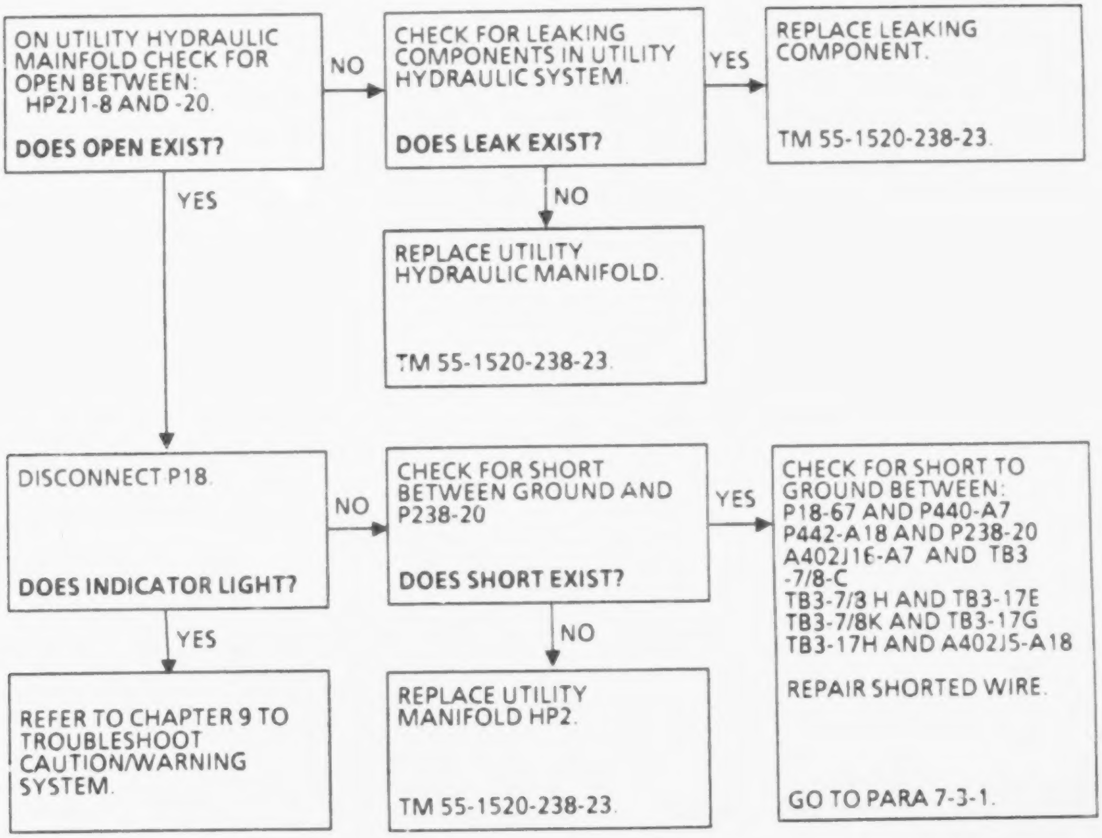

FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL LOW UTIL HYD CAUTION LIGHT

PILOT CAUTION/WARNING PANEL

MM04/1-714

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON UTILITY HYDRAULIC MAINFOLD CHECK FOR OPEN BETWEEN: HP2J1-8 AND -20.

DOES OPEN EXIST?

CHECK FOR LEAKING COMPONENTS IN UTILITY HYDRAULIC SYSTEM.

DOES LEAK EXIST?

REPLACE LEAKING COMPONENT.

TM 55-1520-238-23.

REPLACE UTILITY HYDRAULIC MANIFOLD.

TM 55-1520-238-23.

DISCONNECT P18.

DOES INDICATOR LIGHT?

CHECK FOR SHORT BETWEEN GROUND AND P238-20

DOES SHORT EXIST?

CHECK FOR SHORT TO GROUND BETWEEN:
P18-67 AND P440-A7
P442-A18 AND P238-20
A402J16-A7 AND TB3 -7/8-C
TB3-7/8 H AND TB3-17E
TB3-7/8K AND TB3-17G
TB3-17H AND A402J5-A18

REPAIR SHORTED WIRE.

GO TO PARA 7-3-1.

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING SYSTEM.

REPLACE UTILITY MANIFOLD HP2.

TM 55-1520-238-23.

END OF TASK

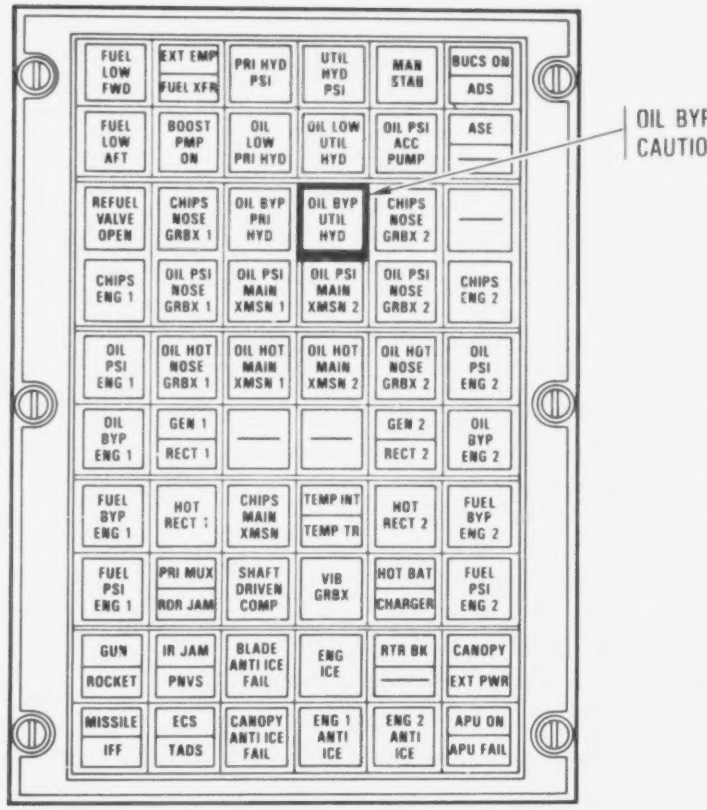
7-3-7. OIL BYP UTIL HYD CAUTION LIGHT IS ON

Tools: (para 7-3-6)

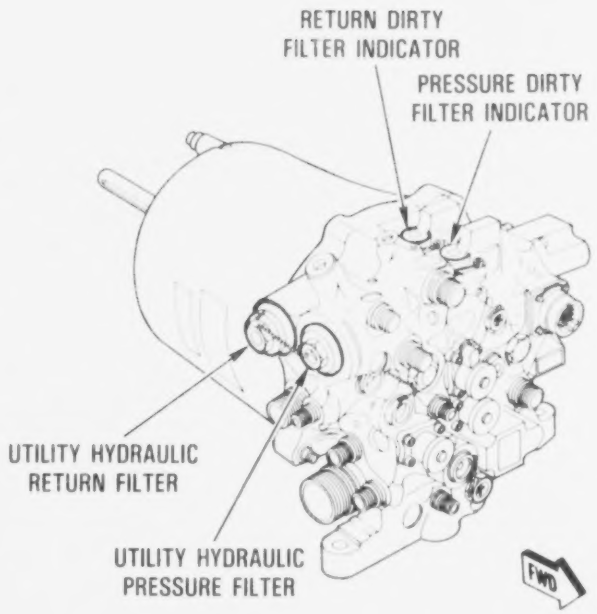
Personnel Required: (para 7-3-6)

References: (para 7-3-6)

Equipment Conditions: (para 7-3-6)

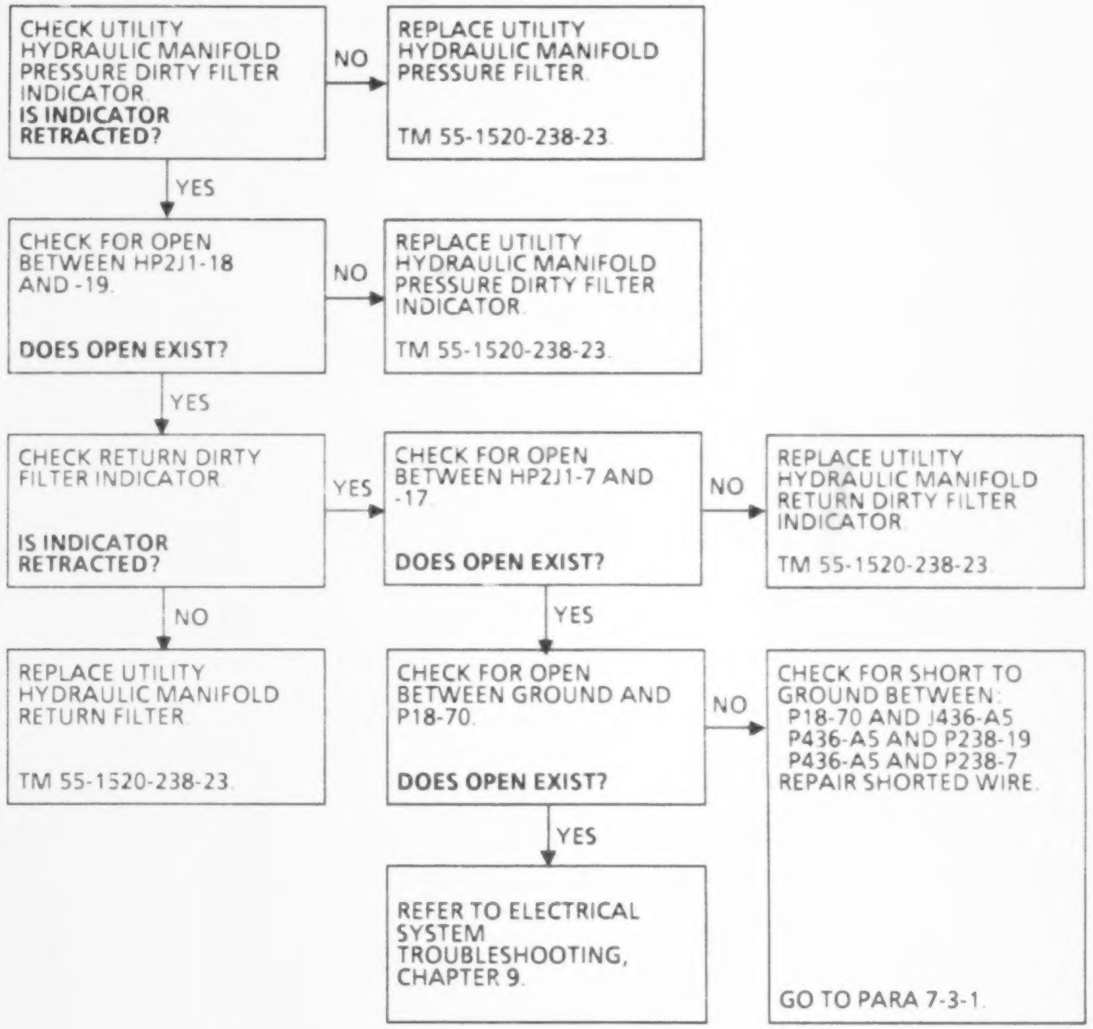

FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
ROR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL
OIL BYP UTIL HYD CAUTION LIGHT

PILOT CAUTION/WARNING PANEL


RETURN DIRTY FILTER INDICATOR
PRESSURE DIRTY FILTER INDICATOR
UTILITY HYDRAULIC RETURN FILTER
UTILITY HYDRAULIC PRESSURE FILTER
FWD

UTILITY HYDRAULIC MANIFOLD

MM04/1-715



CHECK UTILITY HYDRAULIC MANIFOLD PRESSURE DIRTY FILTER INDICATOR.
IS INDICATOR RETRACTED?

NO → REPLACE UTILITY HYDRAULIC MANIFOLD PRESSURE FILTER.
TM 55-1520-238-23.

YES ↓ CHECK FOR OPEN BETWEEN HP2J1-18 AND -19.
DOES OPEN EXIST?

NO → REPLACE UTILITY HYDRAULIC MANIFOLD PRESSURE DIRTY FILTER INDICATOR.
TM 55-1520-238-23.

YES ↓ CHECK RETURN DIRTY FILTER INDICATOR.
IS INDICATOR RETRACTED?

NO ↓ REPLACE UTILITY HYDRAULIC MANIFOLD RETURN FILTER.
TM 55-1520-238-23.

YES → CHECK FOR OPEN BETWEEN HP2J1-7 AND -17.
DOES OPEN EXIST?

NO → REPLACE UTILITY HYDRAULIC MANIFOLD RETURN DIRTY FILTER INDICATOR.
TM 55-1520-238-23.

YES ↓ CHECK FOR OPEN BETWEEN GROUND AND P18-70.
DOES OPEN EXIST?

YES ↓ REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

NO → CHECK FOR SHORT TO GROUND BETWEEN:
P18-70 AND J436-A5
P436-A5 AND P238-19
P436-A5 AND P238-7
REPAIR SHORTED WIRE.
GO TO PARA 7-3-1.

END OF TASK

7-3-8. UTIL HYD CAUTION LIGHT IS ON

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

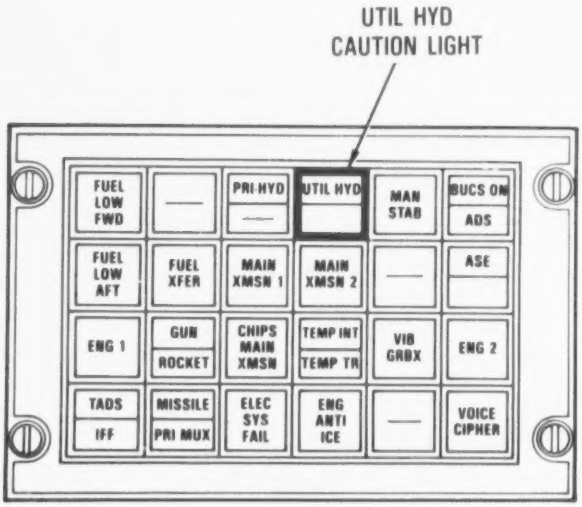
67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

TM 55-1520-238-23

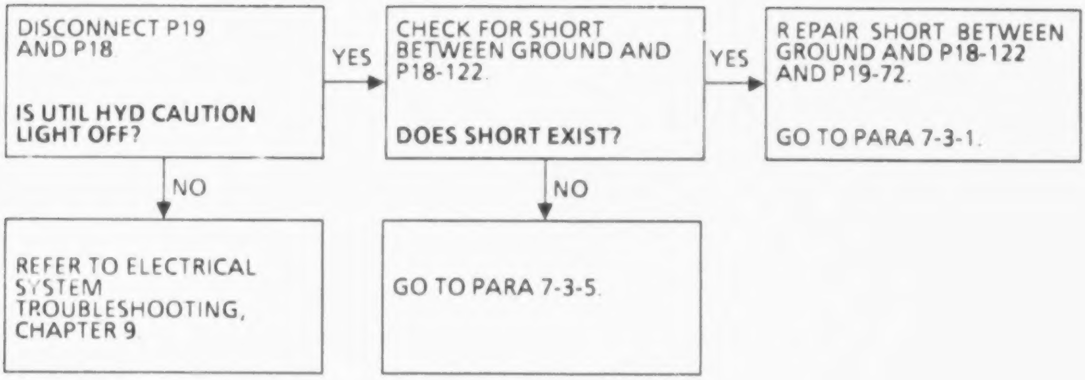
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (utility)
Para 1-3-2	ICS connected


UTIL HYD CAUTION LIGHT
FUEL LOW FWD
PRI HYD
UTIL HYD
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
FUEL XFER
MAIN XMSN 1
MAIN XMSN 2
ASE
ENG 1
GUN
ROCKET
CHIPS MAIN XMSN
TEMP INT
TEMP TR
VIB GRBX
ENG 2
TADS
IFF
MISSILE
PRI MUX
ELEC SYS FAIL
ENG ANTI ICE
VOICE CIPHER

CPG CAUTION/WARNING PANEL

MM04/1-716


DISCONNECT P19 AND P18.
IS UTIL HYD CAUTION LIGHT OFF?
YES
CHECK FOR SHORT BETWEEN GROUND AND P18-122.
DOES SHORT EXIST?
YES
REPAIR SHORT BETWEEN GROUND AND P18-122 AND P19-72.
GO TO PARA 7-3-1.
NO
REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.
NO
GO TO PARA 7-3-5.

END OF TASK

7-3-12. ROTOR BRAKE DOES NOT RELEASE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

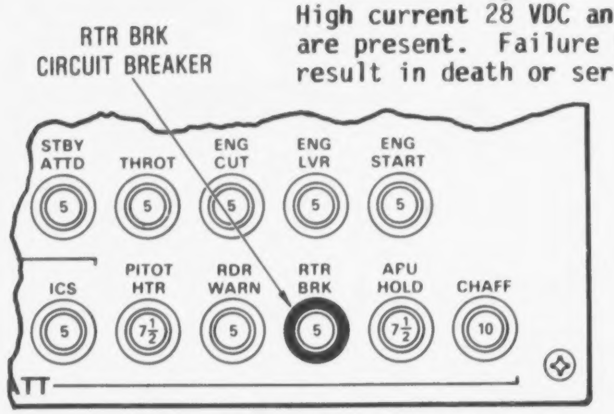
TM 55-1520-238-23

Equipment Conditions:

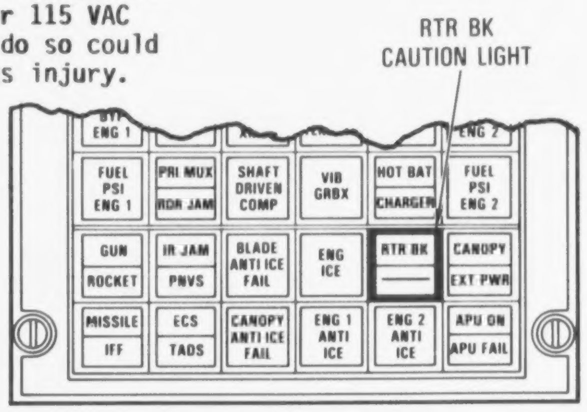
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (utility)
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

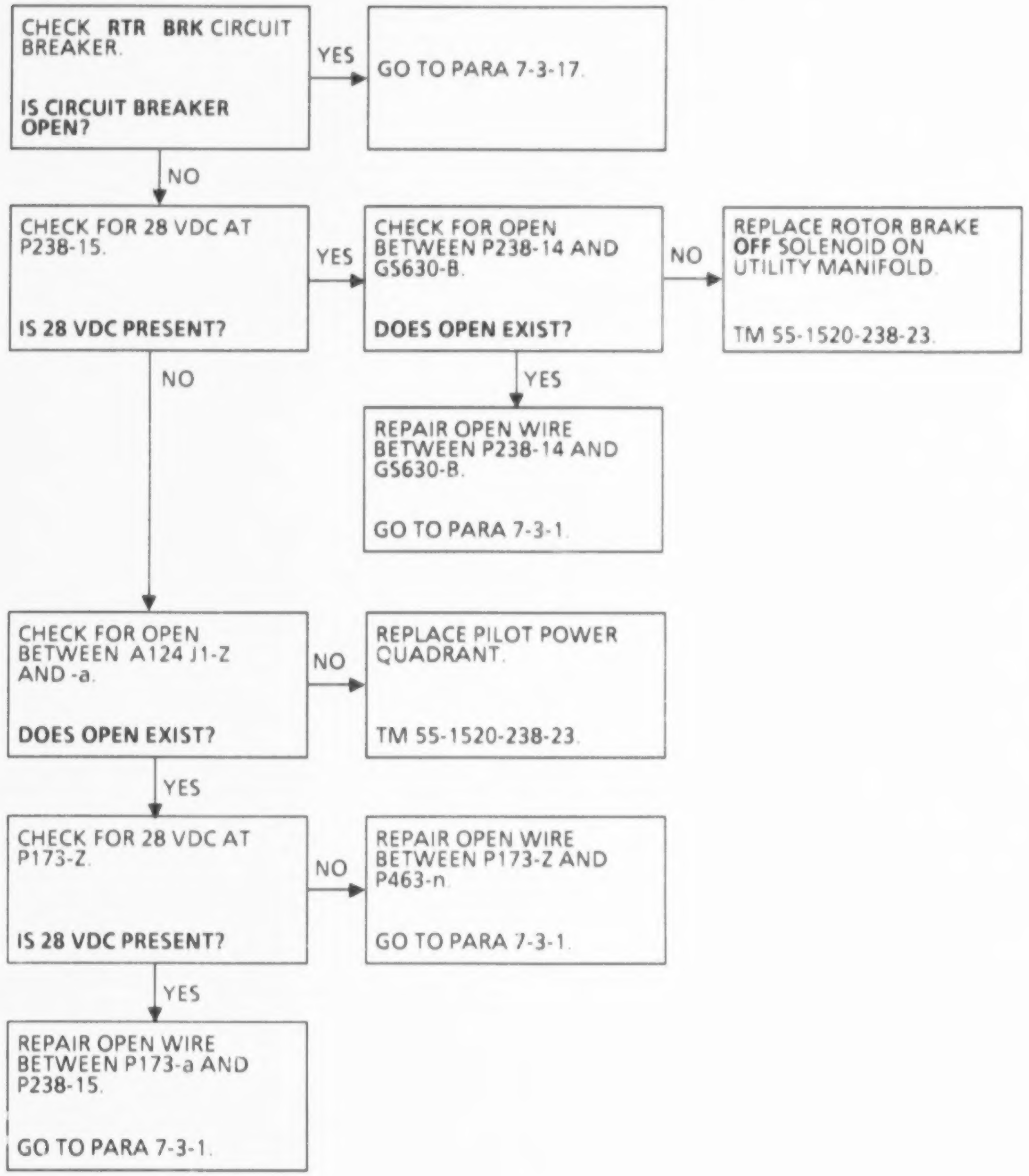

RTR BRK CIRCUIT BREAKER
STBY ATTD
THROT
ENG CUT
ENG LVR
ENG START
ICS
PITOT HTR
RDR WARN
RTR BRK
APU HOLD
CHAFF
5
5
5
5
5
5
7½
5
5
7½
10
ATT

PILOT CENTER CIRCUIT BREAKER PANEL


RTR BK CAUTION LIGHT
ENG 1
ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL

MM04/1-720


CHECK RTR BRK CIRCUIT BREAKER. IS CIRCUIT BREAKER OPEN?
YES
GO TO PARA 7-3-17.
NO
CHECK FOR 28 VDC AT P238-15. IS 28 VDC PRESENT?
YES
CHECK FOR OPEN BETWEEN P238-14 AND GS630-B. DOES OPEN EXIST?
NO
REPLACE ROTOR BRAKE OFF SOLENOID ON UTILITY MANIFOLD. TM 55-1520-238-23.
YES
REPAIR OPEN WIRE BETWEEN P238-14 AND GS630-B. GO TO PARA 7-3-1.
NO
CHECK FOR OPEN BETWEEN A124 J1-Z AND -a. DOES OPEN EXIST?
NO
REPLACE PILOT POWER QUADRANT. TM 55-1520-238-23.
YES
CHECK FOR 28 VDC AT P173-Z. IS 28 VDC PRESENT?
NO
REPAIR OPEN WIRE BETWEEN P173-Z AND P463-n. GO TO PARA 7-3-1.
YES
REPAIR OPEN WIRE BETWEEN P173-a AND P238-15. GO TO PARA 7-3-1.

END OF TASK

7-3-11. RTR BK CAUTION LIGHT IS OFF

Tools: (para 7-3-10)

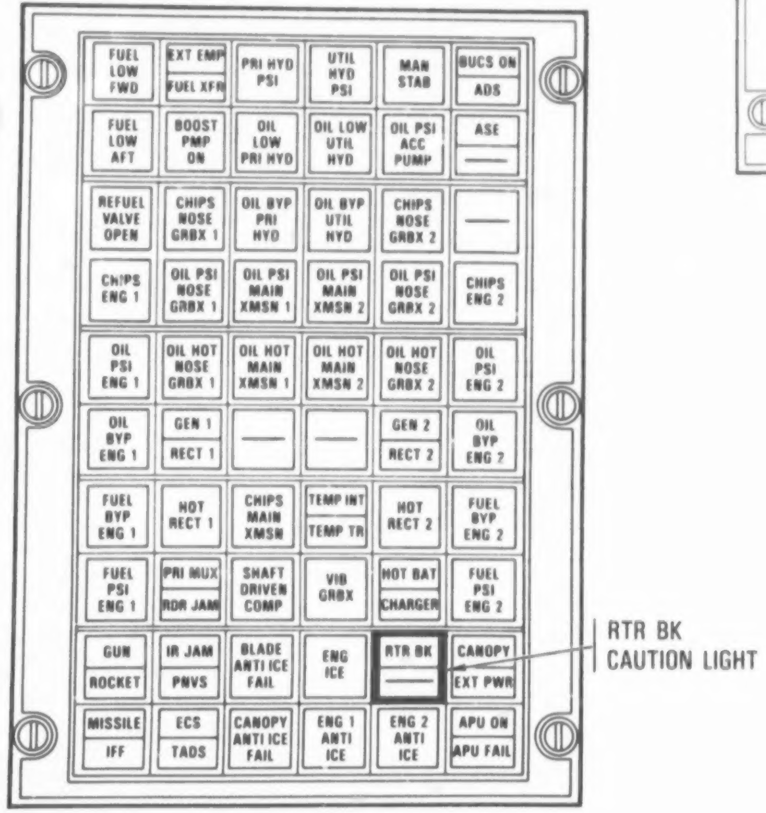
Personnel Required: (para 7-3-10)

References: (para 7-3-10)

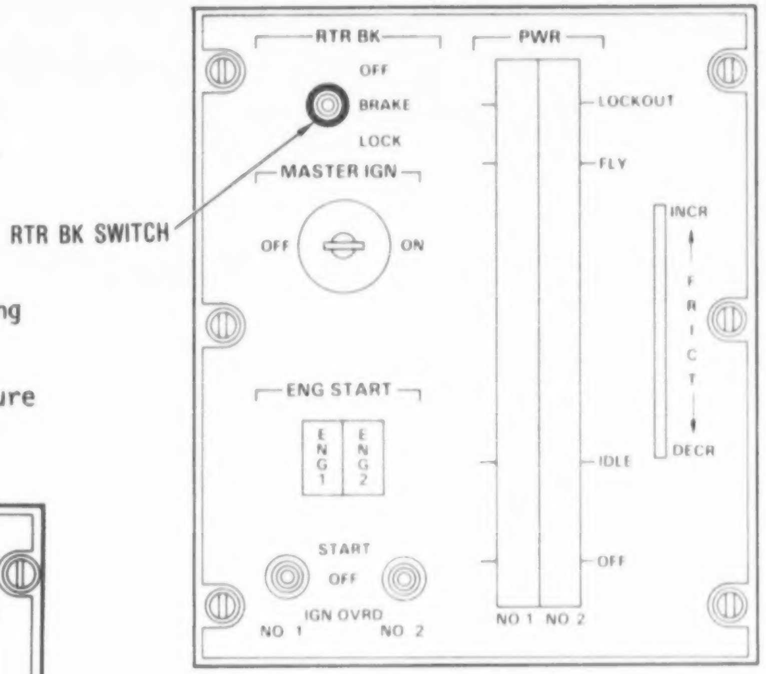
Equipment Conditions: (para 7-3-10)

WARNING

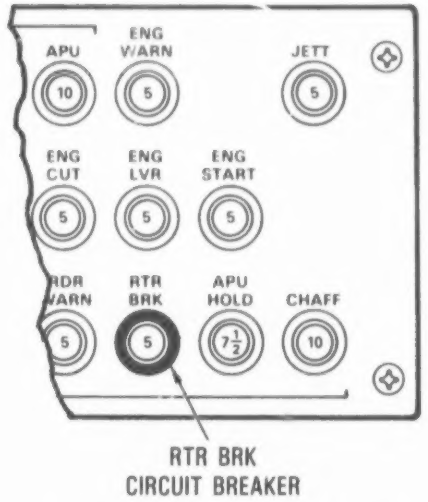
Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


FUEL LOW FWD
EXT EMP
FUEL XFR
PRI HYD PSI
UTIL HYD PSI
MAN STAB
BUCS ON
ADS
FUEL LOW AFT
BOOST PMP ON
OIL LOW PRI HYD
OIL LOW UTIL HYD
OIL PSI ACC PUMP
ASE
REFUEL VALVE OPEN
CHIPS NOSE GRBX 1
OIL BYP PRI HYD
OIL BYP UTIL HYD
CHIPS NOSE GRBX 2
CHIPS ENG 1
OIL PSI NOSE GRBX 1
OIL PSI MAIN XMSN 1
OIL PSI MAIN XMSN 2
OIL PSI NOSE GRBX 2
CHIPS ENG 2
OIL PSI ENG 1
OIL HOT NOSE GRBX 1
OIL HOT MAIN XMSN 1
OIL HOT MAIN XMSN 2
OIL HOT NOSE GRBX 2
OIL PSI ENG 2
OIL BYP ENG 1
GEN 1
RECT 1
GEN 2
RECT 2
OIL BYP ENG 2
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL
RTR BK CAUTION LIGHT

PILOT CAUTION/WARNING PANEL

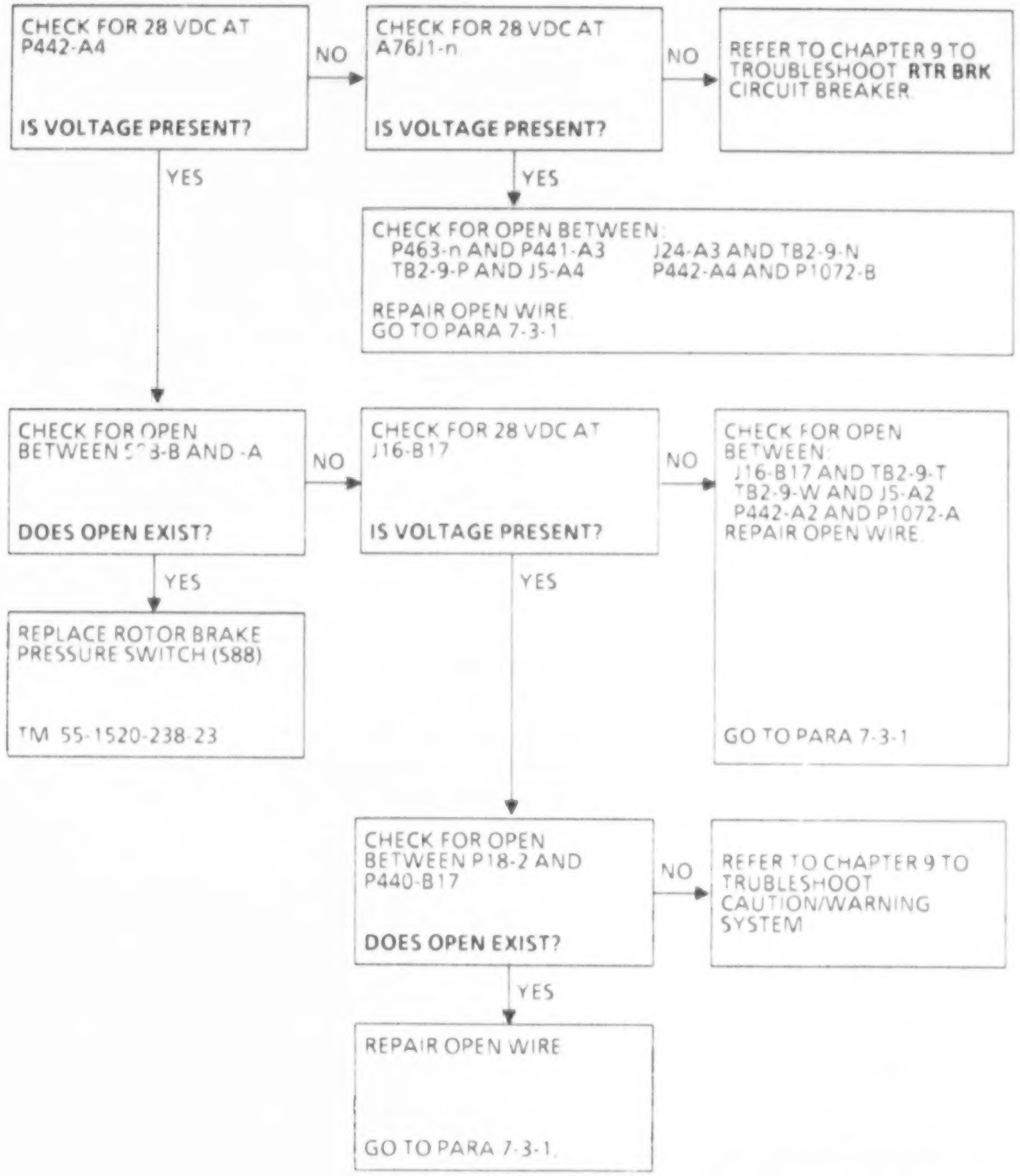

RTR BK
OFF
BRAKE
LOCK
RTR BK SWITCH
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
PWR
LOCKOUT
FLY
IDLE
OFF
NO 1
NO 2
INCR
FRICT
DECR

PILOT POWER QUADRANT


APU
10
ENG WARN
5
JETT
5
ENG CUT
5
ENG LVR
5
ENG START
5
RDR WARN
5
RTR BRK
5
APU HOLD
7½
CHAFF
10
RTR BRK CIRCUIT BREAKER

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-719


CHECK FOR 28 VDC AT P442-A4
IS VOLTAGE PRESENT?
NO
CHECK FOR 28 VDC AT A76J1-n
IS VOLTAGE PRESENT?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT RTR BRK CIRCUIT BREAKER.
YES
CHECK FOR OPEN BETWEEN: P463-n AND P441-A3 J24-A3 AND TB2-9-N TB2-9-P AND J5-A4 P442-A4 AND P1072-B
REPAIR OPEN WIRE. GO TO PARA 7-3-1.
YES
CHECK FOR OPEN BETWEEN S88-B AND -A
DOES OPEN EXIST?
NO
CHECK FOR 28 VDC AT J16-B17
IS VOLTAGE PRESENT?
NO
CHECK FOR OPEN BETWEEN: J16-B17 AND TB2-9-T TB2-9-W AND J5-A2 P442-A2 AND P1072-A REPAIR OPEN WIRE.
GO TO PARA 7-3-1
YES
REPLACE ROTOR BRAKE PRESSURE SWITCH (S88)
TM 55-1520-238-23
YES
CHECK FOR OPEN BETWEEN P18-2 AND P440-B17
DOES OPEN EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING SYSTEM
YES
REPAIR OPEN WIRE
GO TO PARA 7-3-1.

END OF TASK

7-3-13. ROTOR BRAKE - DOES NOT STOP ROTOR ROTATION

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

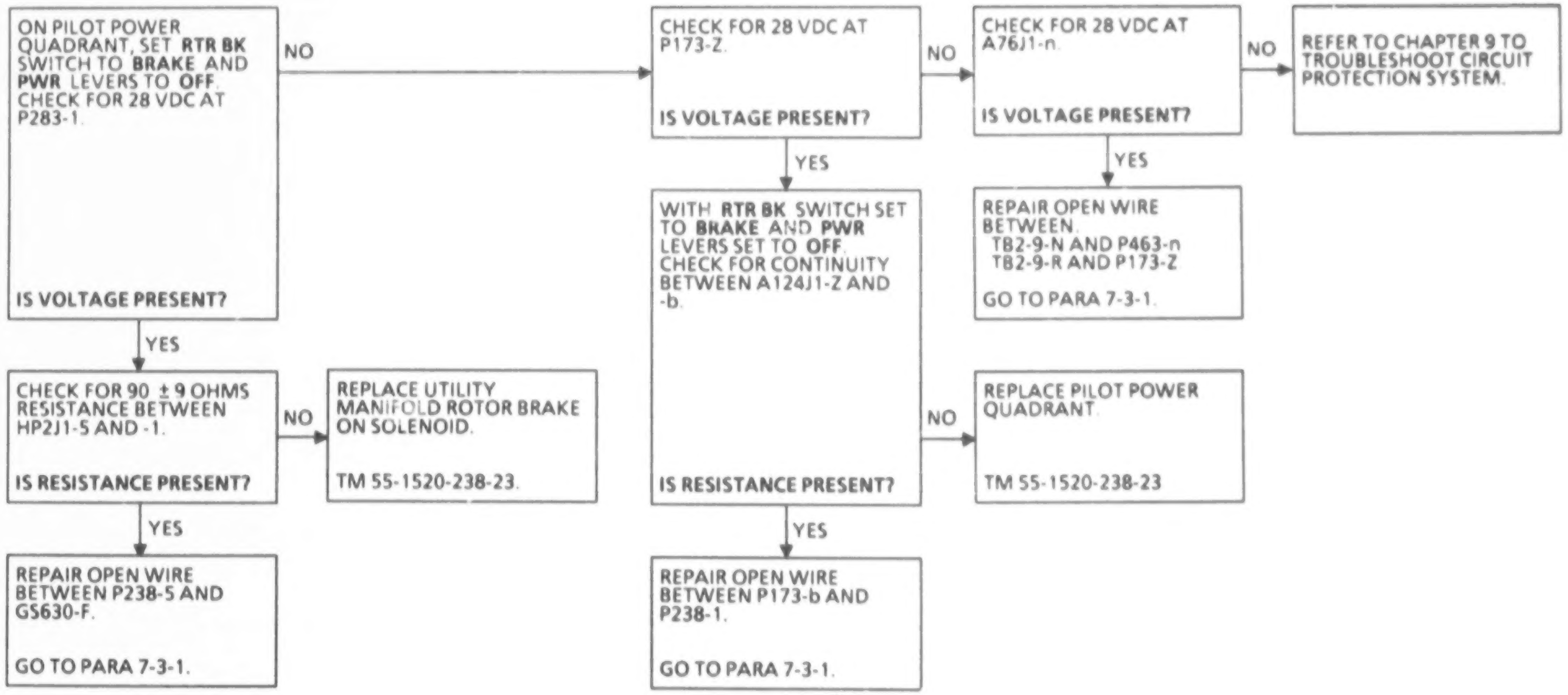
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Access provisions - doors 290R, 290L, and L325 opened

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON PILOT POWER QUADRANT, SET **RTR BK** SWITCH TO **BRAKE** AND **PWR** LEVERS TO **OFF**. CHECK FOR 28 VDC AT P283-1.

IS VOLTAGE PRESENT?

CHECK FOR 90 ±9 OHMS RESISTANCE BETWEEN HP2J1-5 AND -1.

IS RESISTANCE PRESENT?

REPLACE UTILITY MANIFOLD ROTOR BRAKE ON SOLENOID.

TM 55-1520-238-23.

REPAIR OPEN WIRE BETWEEN P238-5 AND GS630-F.

GO TO PARA 7-3-1.

CHECK FOR 28 VDC AT P173-Z.

IS VOLTAGE PRESENT?

WITH **RTR BK** SWITCH SET TO **BRAKE** AND **PWR** LEVERS SET TO **OFF**. CHECK FOR CONTINUITY BETWEEN A124J1-Z AND -b.

IS RESISTANCE PRESENT?

REPAIR OPEN WIRE BETWEEN P173-b AND P238-1.

GO TO PARA 7-3-1.

CHECK FOR 28 VDC AT A76J1-n.

IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN
TB2-9-N AND P463-n
TB2-9-R AND P173-Z

GO TO PARA 7-3-1.

REPLACE PILOT POWER QUADRANT.

TM 55-1520-238-23

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

END OF TASK

7-3-14. TAIL WHEEL ADVISORY LIGHT - IS NOT LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid	1730-00-102-8665
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

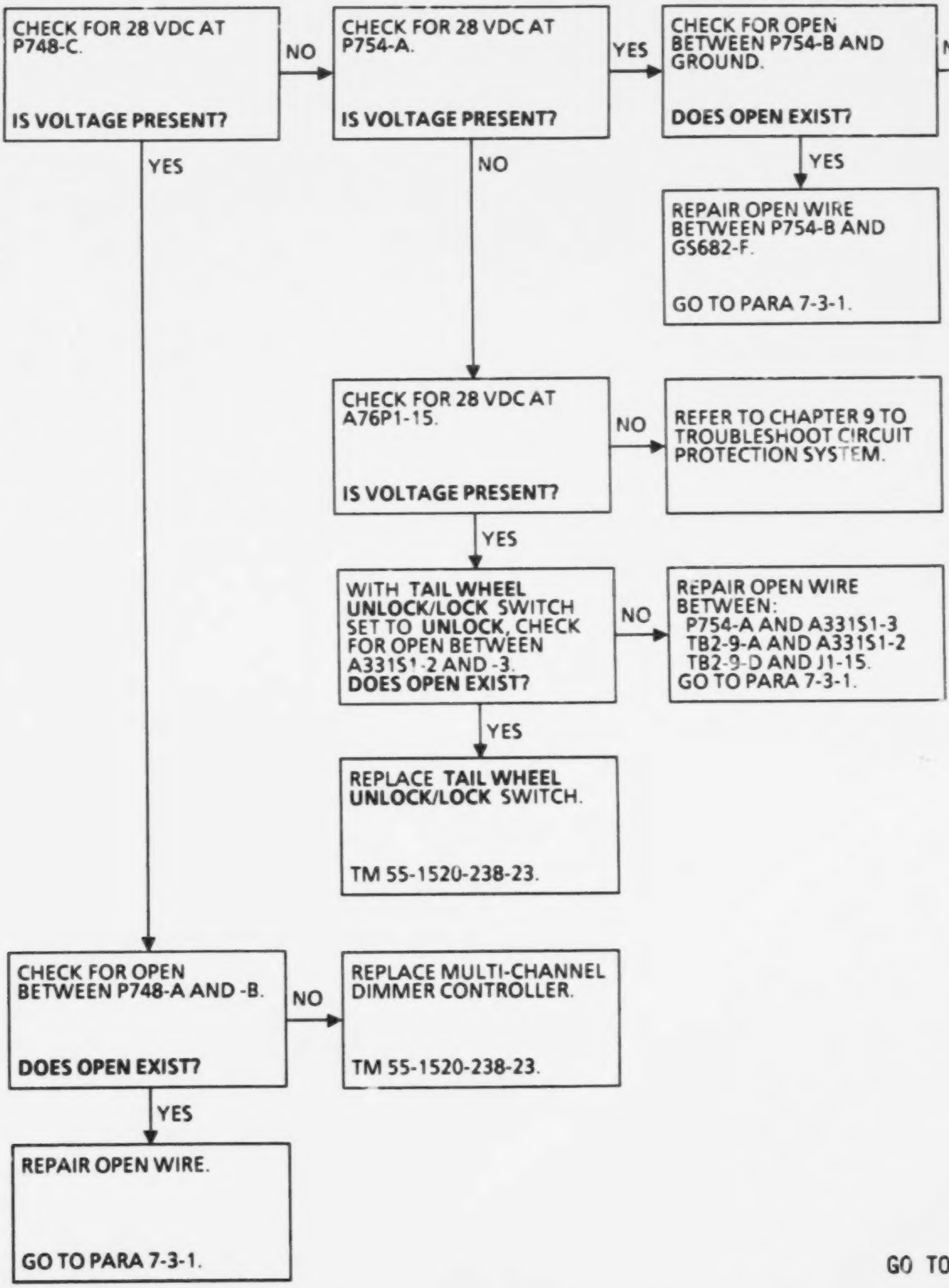
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical - Hydraulic (utility) Tail landing gear lock actuator target adjustment - completed Access provisions - door L90 opened

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR 28 VDC AT P748-C.

IS VOLTAGE PRESENT?

CHECK FOR 28 VDC AT P754-A.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN P754-B AND GROUND.

DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN P754-B AND GS682-F.

GO TO PARA 7-3-1.

CHECK FOR 28 VDC AT A76P1-15.

IS VOLTAGE PRESENT?

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

WITH **TAIL WHEEL UNLOCK/LOCK** SWITCH SET TO **UNLOCK**, CHECK FOR OPEN BETWEEN A331S1-2 AND -3.
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
P754-A AND A331S1-3
TB2-9-A AND A331S1-2
TB2-9-D AND J1-15.
GO TO PARA 7-3-1.

REPLACE **TAIL WHEEL UNLOCK/LOCK** SWITCH.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN P748-A AND -B.

DOES OPEN EXIST?

REPLACE MULTI-CHANNEL DIMMER CONTROLLER.

TM 55-1520-238-23.

REPAIR OPEN WIRE.

GO TO PARA 7-3-1.

GO TO NEXT PAGE

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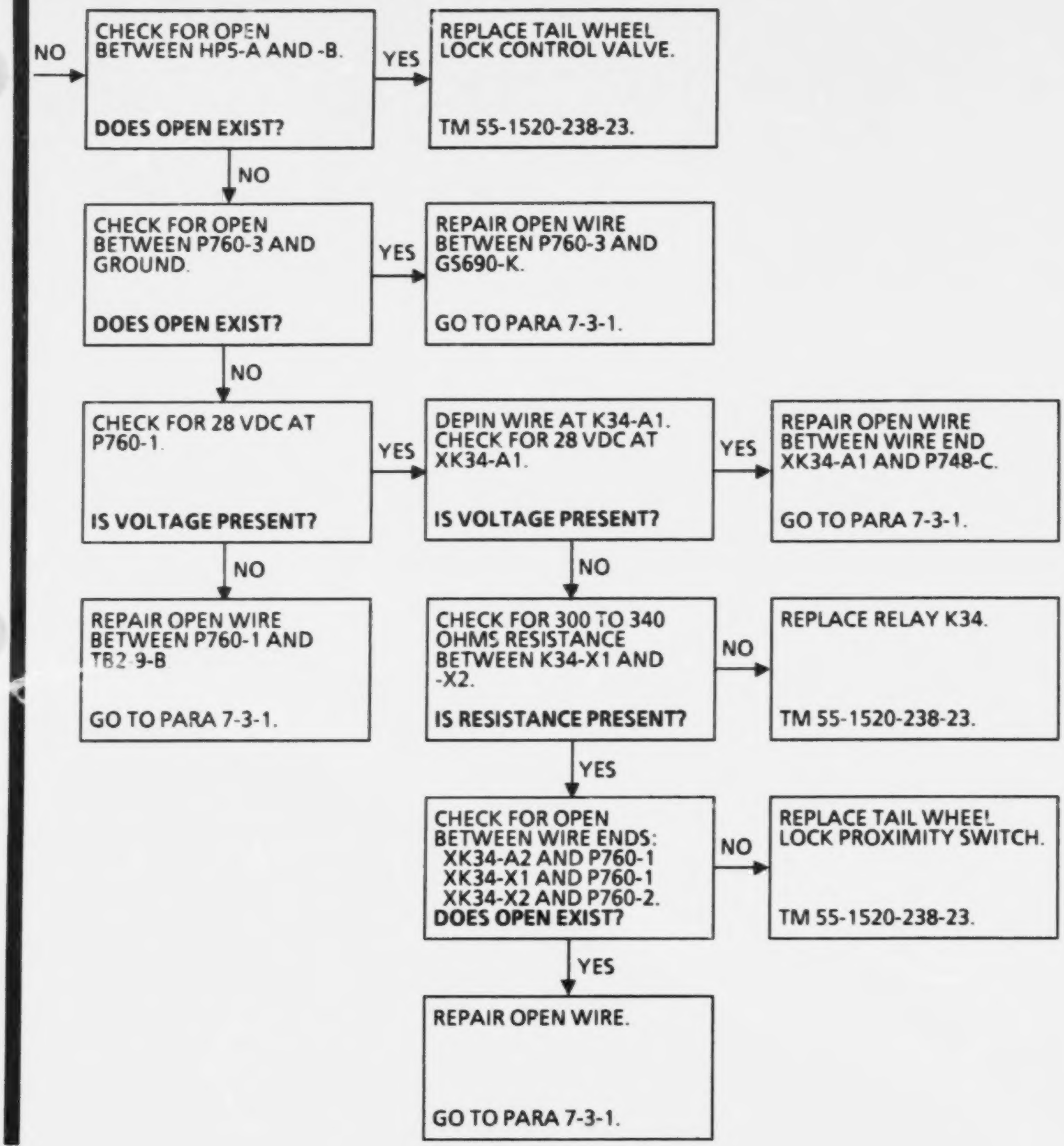
7-3-14. TAIL WHEEL ADVISORY LIGHT - IS NOT LIGHTED (cont)


NO
CHECK FOR OPEN BETWEEN HP5-A AND -B. DOES OPEN EXIST?
YES
REPLACE TAIL WHEEL LOCK CONTROL VALVE. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN P760-3 AND GROUND. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN P760-3 AND GS690-K. GO TO PARA 7-3-1.
NO
CHECK FOR 28 VDC AT P760-1. IS VOLTAGE PRESENT?
YES
DEPIN WIRE AT K34-A1. CHECK FOR 28 VDC AT XK34-A1. IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN WIRE END XK34-A1 AND P748-C. GO TO PARA 7-3-1.
NO
REPAIR OPEN WIRE BETWEEN P760-1 AND TB2-9-B. GO TO PARA 7-3-1.
NO
CHECK FOR 300 TO 340 OHMS RESISTANCE BETWEEN K34-X1 AND -X2. IS RESISTANCE PRESENT?
NO
REPLACE RELAY K34. TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN WIRE ENDS: XK34-A2 AND P760-1 XK34-X1 AND P760-1 XK34-X2 AND P760-2. DOES OPEN EXIST?
NO
REPLACE TAIL WHEEL LOCK PROXIMITY SWITCH. TM 55-1520-238-23.
YES
REPAIR OPEN WIRE. GO TO PARA 7-3-1.

7-3-14

END OF TASK

7-3-15. TAIL WHEEL LOCK ACTUATOR DOES NOT UNLOCK TAIL WHEEL

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit, Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

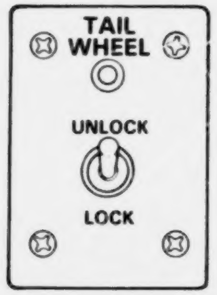
TM 55-1520-238-23

Equipment Conditions:

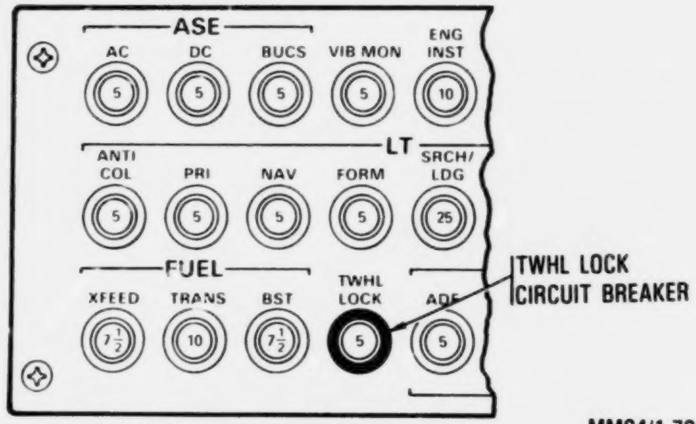
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Hydraulic (Utility)
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

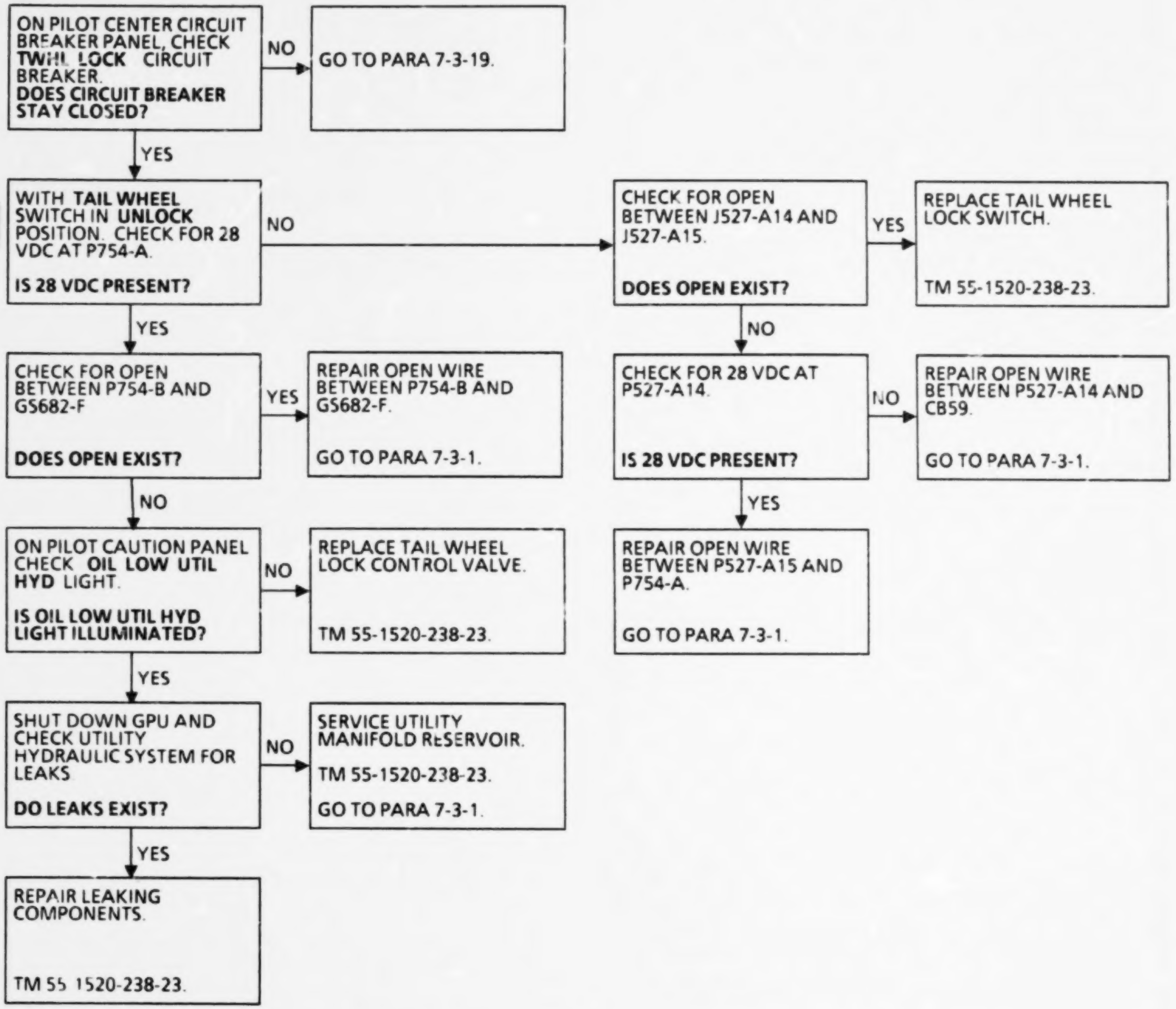

TAIL WHEEL
UNLOCK
LOCK

TAIL WHEEL SWITCH


ASE
AC
DC
BUCS
VIB MON
ENG INST
5
5
5
5
10
ANTI COL
PRI
NAV
FORM
SRCH/LDG
LT
5
5
5
5
25
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
7½
10
7½
5
5
TWHL LOCK CIRCUIT BREAKER

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-722


NO
YES
NO
YES
YES
NO
NO
YES
NO
NO
YES
YES
NO
YES

ON PILOT CENTER CIRCUIT BREAKER PANEL, CHECK **TWHL LOCK** CIRCUIT BREAKER. **DOES CIRCUIT BREAKER STAY CLOSED?**

GO TO PARA 7-3-19.

WITH **TAIL WHEEL** SWITCH IN **UNLOCK** POSITION. CHECK FOR 28 VDC AT P754-A. **IS 28 VDC PRESENT?**

CHECK FOR OPEN BETWEEN J527-A14 AND J527-A15. **DOES OPEN EXIST?**

REPLACE TAIL WHEEL LOCK SWITCH. TM 55-1520-238-23.

CHECK FOR 28 VDC AT P527-A14. **IS 28 VDC PRESENT?**

REPAIR OPEN WIRE BETWEEN P527-A14 AND CB59. GO TO PARA 7-3-1.

REPAIR OPEN WIRE BETWEEN P527-A15 AND P754-A. GO TO PARA 7-3-1.

CHECK FOR OPEN BETWEEN P754-B AND GS682-F **DOES OPEN EXIST?**

REPAIR OPEN WIRE BETWEEN P754-B AND GS682-F. GO TO PARA 7-3-1.

ON PILOT CAUTION PANEL CHECK **OIL LOW UTIL HYD** LIGHT. **IS OIL LOW UTIL HYD LIGHT ILLUMINATED?**

REPLACE TAIL WHEEL LOCK CONTROL VALVE. TM 55-1520-238-23.

SHUT DOWN GPU AND CHECK UTILITY HYDRAULIC SYSTEM FOR LEAKS **DO LEAKS EXIST?**

SERVICE UTILITY MANIFOLD RESERVOIR. TM 55-1520-238-23. GO TO PARA 7-3-1.

REPAIR LEAKING COMPONENTS. TM 55 1520-238-23.

END OF TASK

7-3-16. EMERG HYD CIRCUIT BREAKER - DOES NOT STAY CLOSED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

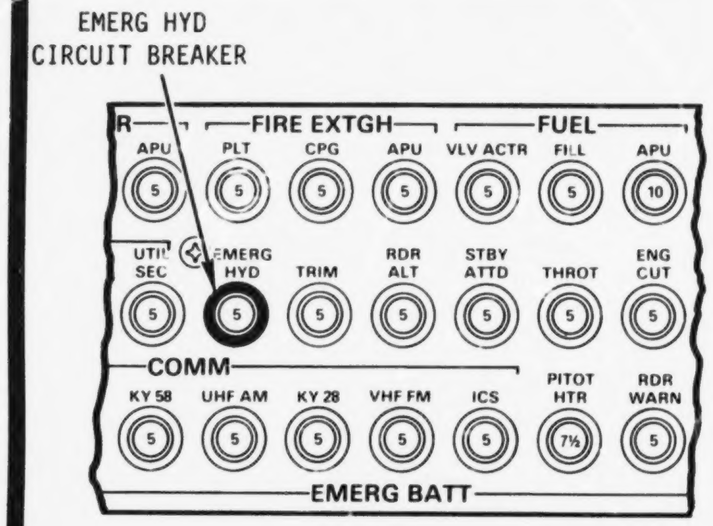
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

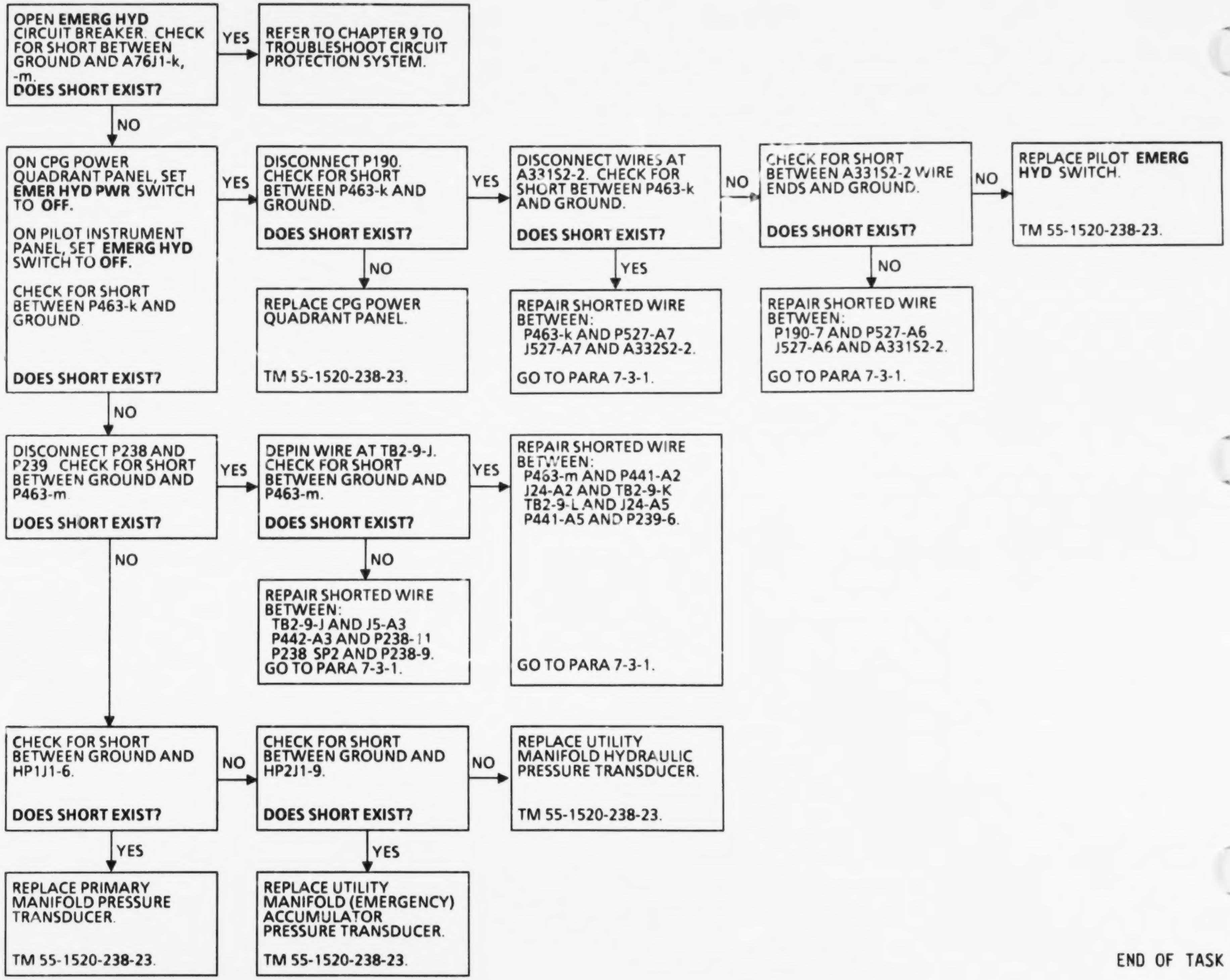
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


EMERG HYD
CIRCUIT BREAKER
R
FIRE EXTGH
FUEL
APU
PLT
CPG
APU
VLV ACTR
FILL
APU
5
5
5
5
5
5
10
UTIL SEC
EMERG HYD
TRIM
RDR ALT
STBY ATTD
THROT
ENG CUT
COMM
KY 58
UHF AM
KY 28
VHF FM
ICS
PITOT HTR
RDR WARN
7½
EMERG BATT

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-733


YES
NO
YES
YES
NO
NO
NO
YES
NO
YES
YES
NO
NO
NO
NO
YES
YES

OPEN **EMERG HYD** CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND A76J1-k, -m.
DOES SHORT EXIST?

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

ON CPG POWER QUADRANT PANEL, SET **EMER HYD PWR** SWITCH TO **OFF.**

ON PILOT INSTRUMENT PANEL, SET **EMERG HYD** SWITCH TO **OFF.**

CHECK FOR SHORT BETWEEN P463-k AND GROUND.

DOES SHORT EXIST?

DISCONNECT P190. CHECK FOR SHORT BETWEEN P463-k AND GROUND.

DOES SHORT EXIST?

DISCONNECT WIRES AT A331S2-2. CHECK FOR SHORT BETWEEN P463-k AND GROUND.

DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN A331S2-2 WIRE ENDS AND GROUND.

DOES SHORT EXIST?

REPLACE PILOT **EMERG HYD** SWITCH.

TM 55-1520-238-23.

REPLACE CPG POWER QUADRANT PANEL.

TM 55-1520-238-23.

REPAIR SHORTED WIRE BETWEEN:
P463-k AND P527-A7
J527-A7 AND A332S2-2.

GO TO PARA 7-3-1.

REPAIR SHORTED WIRE BETWEEN:
P190-7 AND P527-A6
J527-A6 AND A331S2-2.

GO TO PARA 7-3-1.

DISCONNECT P238 AND P239. CHECK FOR SHORT BETWEEN GROUND AND P463-m.

DOES SHORT EXIST?

DEPIN WIRE AT TB2-9-J. CHECK FOR SHORT BETWEEN GROUND AND P463-m.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P463-m AND P441-A2
J24-A2 AND TB2-9-K
TB2-9-L AND J24-A5
P441-A5 AND P239-6.

GO TO PARA 7-3-1.

REPAIR SHORTED WIRE BETWEEN:
TB2-9-J AND J5-A3
P442-A3 AND P238-11
P238 SP2 AND P238-9.
GO TO PARA 7-3-1.

CHECK FOR SHORT BETWEEN GROUND AND HP1J1-6.

DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN GROUND AND HP2J1-9.

DOES SHORT EXIST?

REPLACE UTILITY MANIFOLD HYDRAULIC PRESSURE TRANSDUCER.

TM 55-1520-238-23.

REPLACE PRIMARY MANIFOLD PRESSURE TRANSDUCER.

TM 55-1520-238-23.

REPLACE UTILITY MANIFOLD (EMERGENCY) ACCUMULATOR PRESSURE TRANSDUCER.

TM 55-1520-238-23.

END OF TASK

7-3-17. RTR BRK CIRCUIT BREAKER - DOES NOT STAY CLOSED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

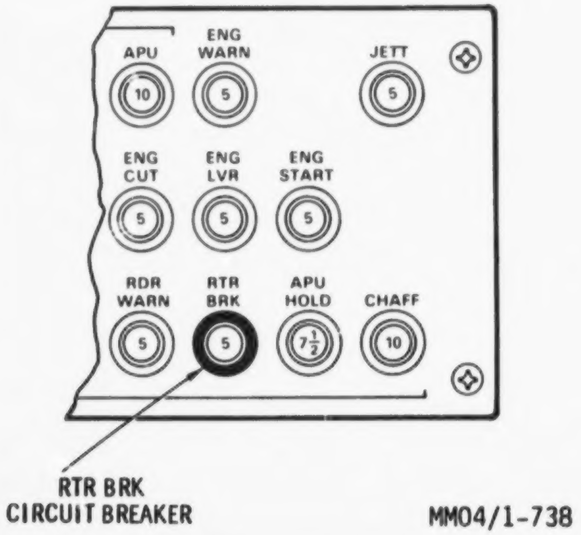
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

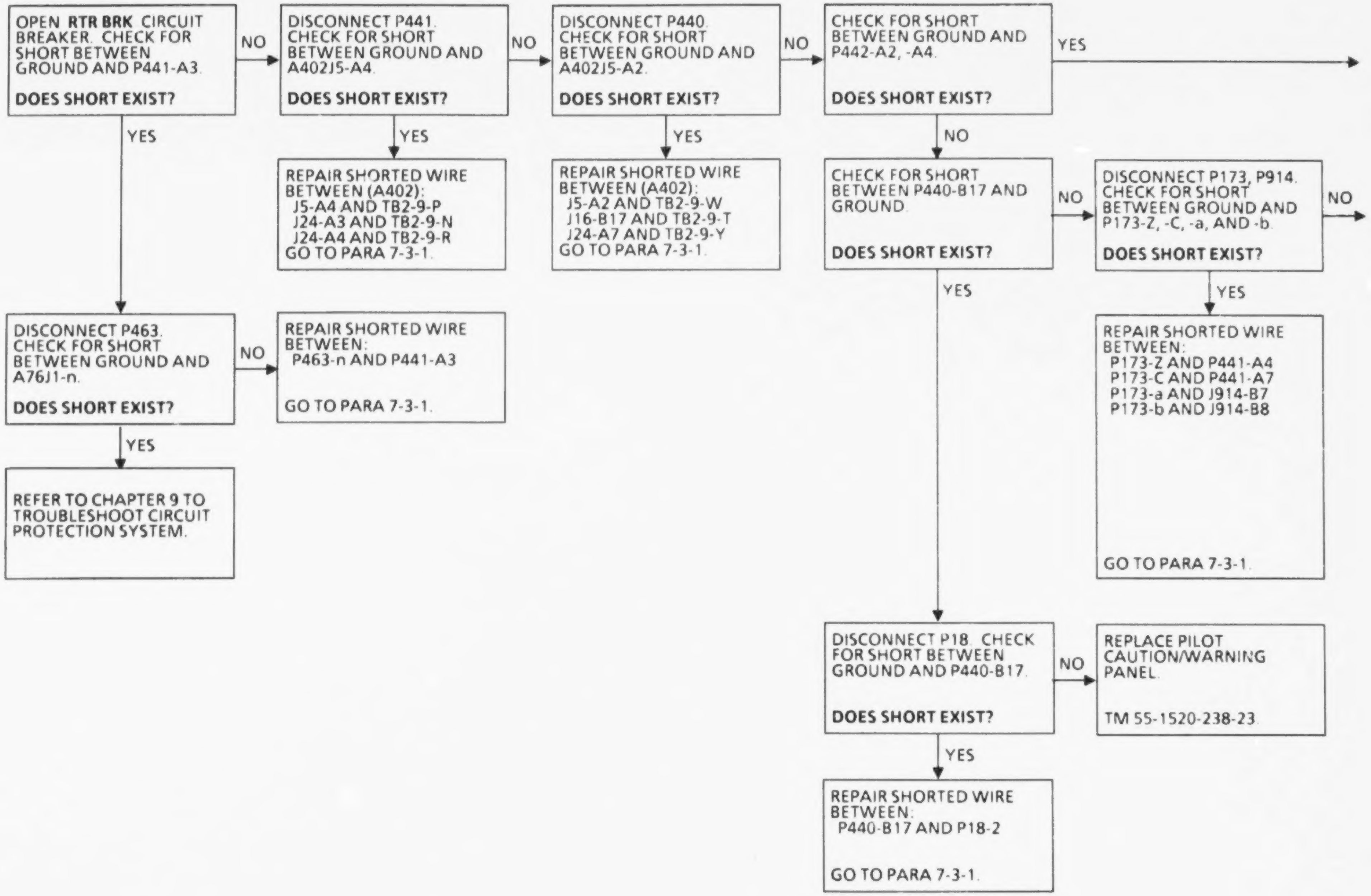
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions L200 panel removed



MM04/1-738

PILOT CENTER CIRCUIT BREAKER PANEL



OPEN **RTR BRK** CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND P441-A3.

DOES SHORT EXIST?

DISCONNECT P441. CHECK FOR SHORT BETWEEN GROUND AND A402J5-A4.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN (A402):
J5-A4 AND TB2-9-P
J24-A3 AND TB2-9-N
J24-A4 AND TB2-9-R
GO TO PARA 7-3-1.

DISCONNECT P440. CHECK FOR SHORT BETWEEN GROUND AND A402J5-A2.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN (A402):
J5-A2 AND TB2-9-W
J16-B17 AND TB2-9-T
J24-A7 AND TB2-9-Y
GO TO PARA 7-3-1.

CHECK FOR SHORT BETWEEN GROUND AND P442-A2, -A4.

DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN P440-B17 AND GROUND.

DOES SHORT EXIST?

DISCONNECT P173, P914. CHECK FOR SHORT BETWEEN GROUND AND P173-Z, -C, -a, AND -b.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P173-Z AND P441-A4
P173-C AND P441-A7
P173-a AND J914-B7
P173-b AND J914-B8

GO TO PARA 7-3-1.

DISCONNECT P463. CHECK FOR SHORT BETWEEN GROUND AND A76J1-n.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P463-n AND P441-A3

GO TO PARA 7-3-1.

REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

DISCONNECT P18. CHECK FOR SHORT BETWEEN GROUND AND P440-B17.

DOES SHORT EXIST?

REPLACE PILOT CAUTION/WARNING PANEL.

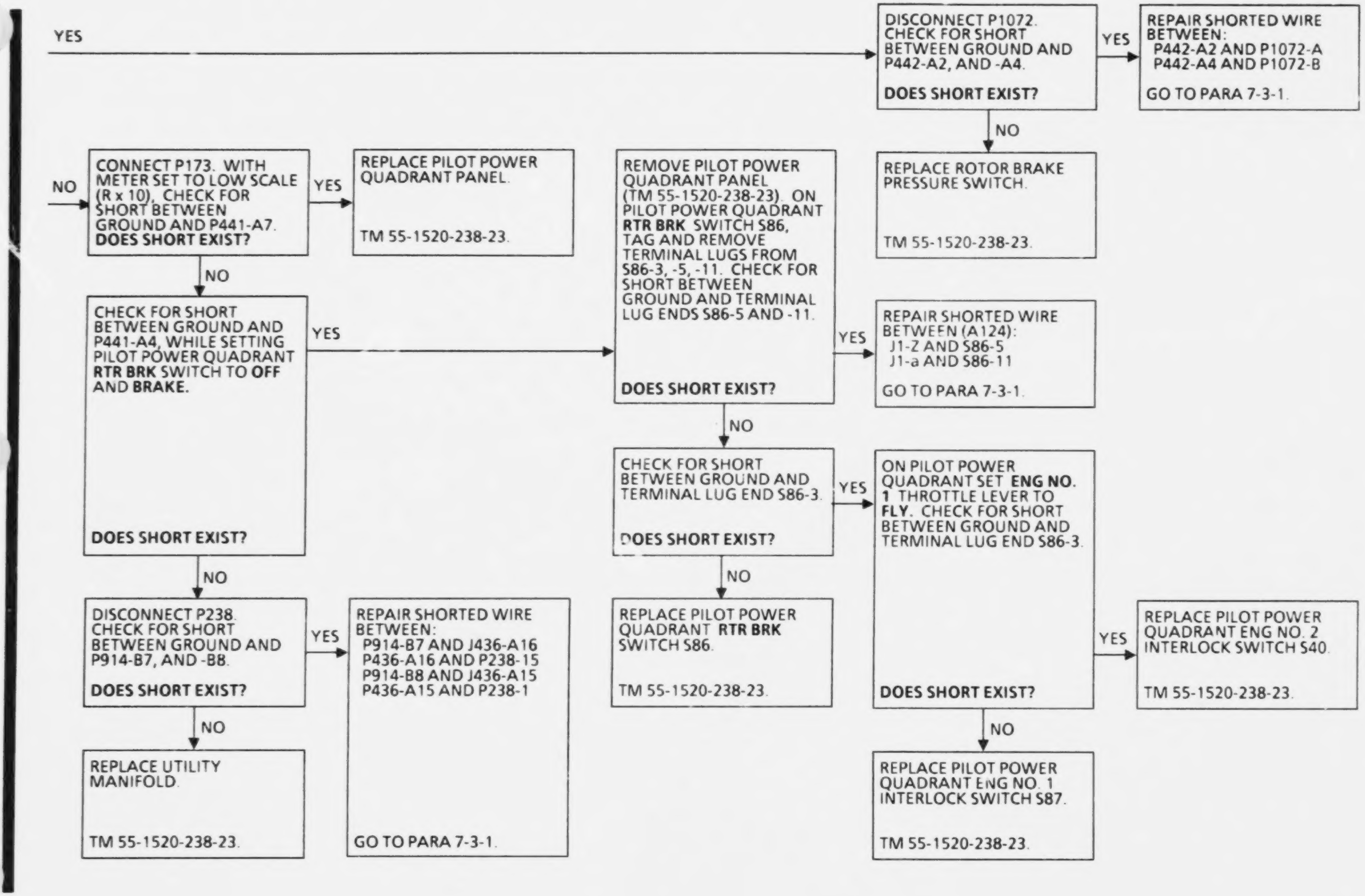
TM 55-1520-238-23.

REPAIR SHORTED WIRE BETWEEN:
P440-B17 AND P18-2

GO TO PARA 7-3-1.

GO TO NEXT PAGE

7-3-17. RTR BRK CIRCUIT BREAKER - DOES NOT STAY CLOSED (cont)



DISCONNECT P1072. CHECK FOR SHORT BETWEEN GROUND AND P442-A2, AND -A4.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P442-A2 AND P1072-A
P442-A4 AND P1072-B
GO TO PARA 7-3-1.

REPLACE ROTOR BRAKE PRESSURE SWITCH.
TM 55-1520-238-23.

CONNECT P173. WITH METER SET TO LOW SCALE (R x 10), CHECK FOR SHORT BETWEEN GROUND AND P441-A7.
DOES SHORT EXIST?

REPLACE PILOT POWER QUADRANT PANEL.
TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN GROUND AND P441-A4, WHILE SETTING PILOT POWER QUADRANT **RTR BRK** SWITCH TO **OFF** AND **BRAKE.**
DOES SHORT EXIST?

REMOVE PILOT POWER QUADRANT PANEL (TM 55-1520-238-23). ON PILOT POWER QUADRANT **RTR BRK** SWITCH S86, TAG AND REMOVE TERMINAL LUGS FROM S86-3, -5, -11. CHECK FOR SHORT BETWEEN GROUND AND TERMINAL LUG ENDS S86-5 AND -11.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN (A124):
J1-Z AND S86-5
J1-a AND S86-11
GO TO PARA 7-3-1.

CHECK FOR SHORT BETWEEN GROUND AND TERMINAL LUG END S86-3.
DOES SHORT EXIST?

ON PILOT POWER QUADRANT SET **ENG NO. 1** THROTTLE LEVER TO **FLY.** CHECK FOR SHORT BETWEEN GROUND AND TERMINAL LUG END S86-3.
DOES SHORT EXIST?

REPLACE PILOT POWER QUADRANT ENG NO. 2 INTERLOCK SWITCH S40.
TM 55-1520-238-23.

REPLACE PILOT POWER QUADRANT ENG NO. 1 INTERLOCK SWITCH S87.
TM 55-1520-238-23.

REPLACE PILOT POWER QUADRANT **RTR BRK** SWITCH S86.
TM 55-1520-238-23.

DISCONNECT P238. CHECK FOR SHORT BETWEEN GROUND AND P914-B7, AND -B8.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P914-B7 AND J436-A16
P436-A16 AND P238-15
P914-B8 AND J436-A15
P436-A15 AND P238-1
GO TO PARA 7-3-1.

REPLACE UTILITY MANIFOLD.
TM 55-1520-238-23.

END OF TASK

7-3-18. RTR BK CAUTION LIGHT STAYS ON WITH ROTOR BRAKE RELEASED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit, Hydraulic Fluid	1730-00-102-8665
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

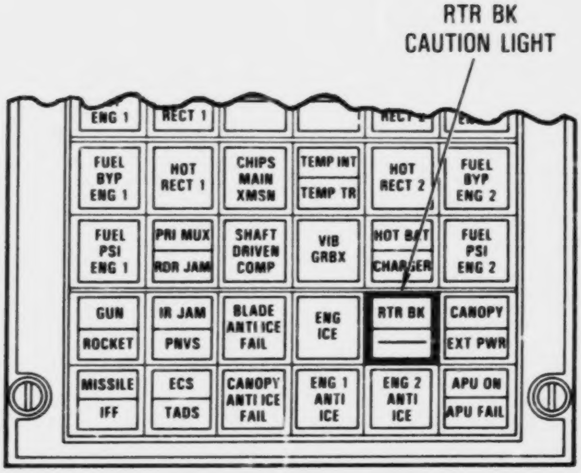
67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

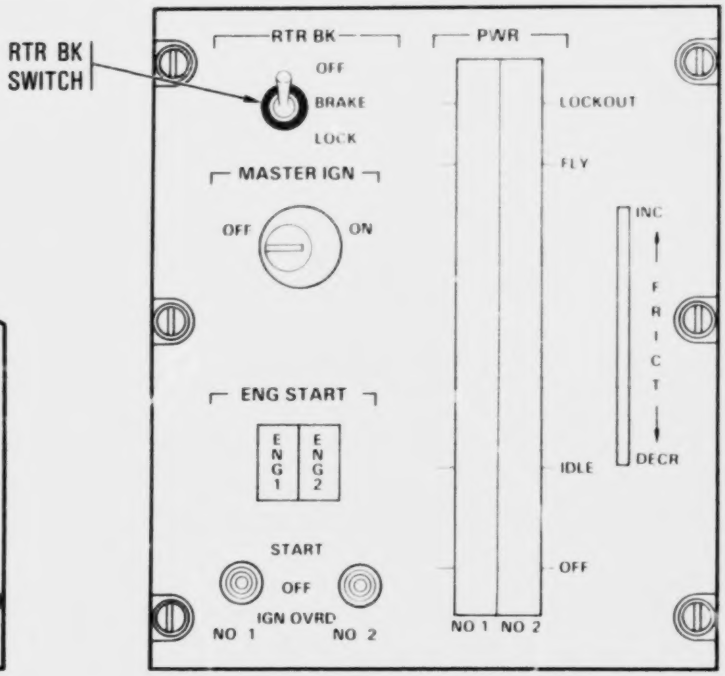
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
Para 1-3-2	ICS connected


RTR BK
CAUTION LIGHT
ENG 1
RECT 1
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL

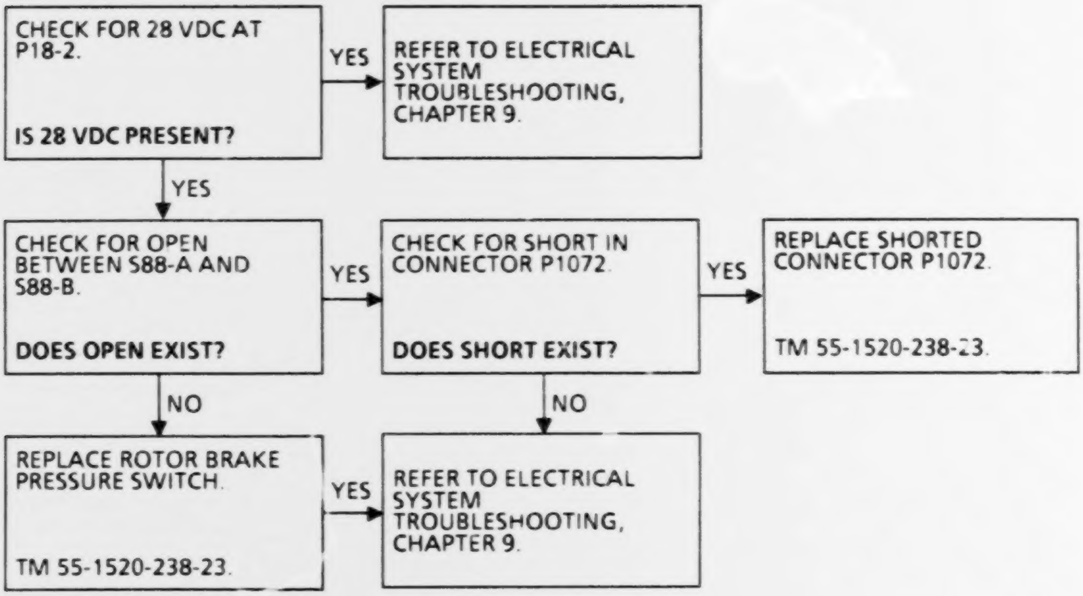

RTR BK
SWITCH
RTR BK
OFF
BRAKE
LOCK
PWR
LOCKOUT
FLY
IDLE
OFF
MASTER IGN
OFF
ON
INC
FRICT
DECR
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO 1
NO 2
NO 1
NO 2

PILOT POWER QUADRANT PANEL

MM04/1-739

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR 28 VDC AT P18-2.
IS 28 VDC PRESENT?
YES
REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.
YES
CHECK FOR OPEN BETWEEN S88-A AND S88-B.
DOES OPEN EXIST?
YES
CHECK FOR SHORT IN CONNECTOR P1072.
DOES SHORT EXIST?
YES
REPLACE SHORTED CONNECTOR P1072.
TM 55-1520-238-23.
NO
NO
REPLACE ROTOR BRAKE PRESSURE SWITCH.
TM 55-1520-238-23.
YES
REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

END OF TASK

7-3-19. TWHL LOCK CIRCUIT BREAKER (CB59)-DOES NOT STAY CLOSED

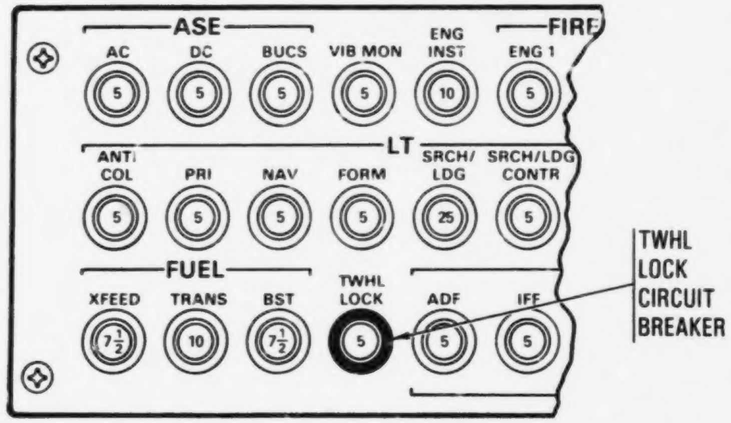
Tools: (para 7-3-18)

Personnel Required: (para 7-3-18)

References: (para 7-3-18)

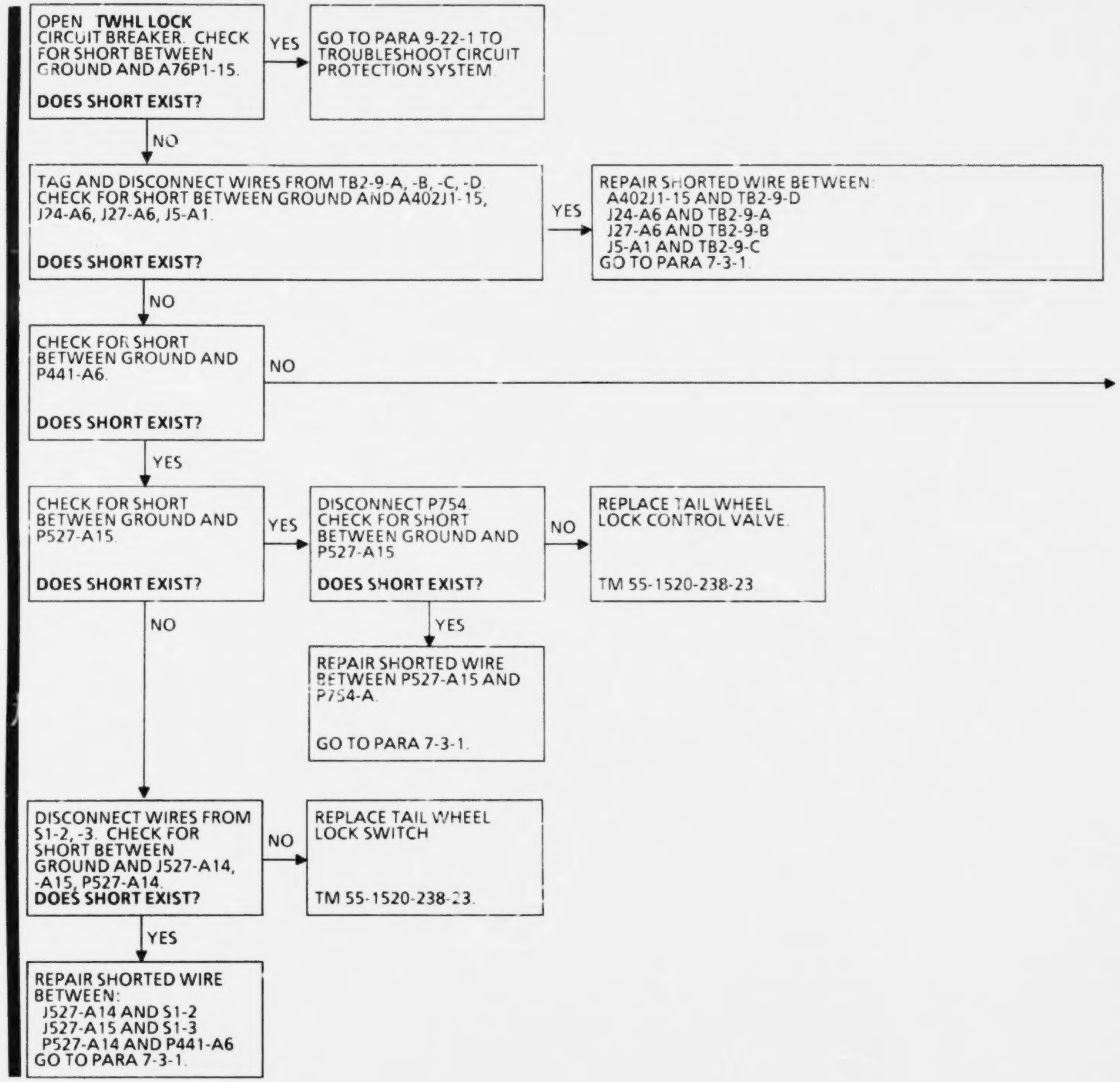
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


ASE
AC
DC
BUCS
VIB MON
ENG INST
ENG 1
FIRE
5
5
5
5
10
5
LT
ANTI COL
PRI
NAV
FORM
SRCH/LDG
SRCH/LDG CONTR
5
5
5
5
25
5
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
IFF
7½
10
7½
5
5
5
TWHL LOCK CIRCUIT BREAKER

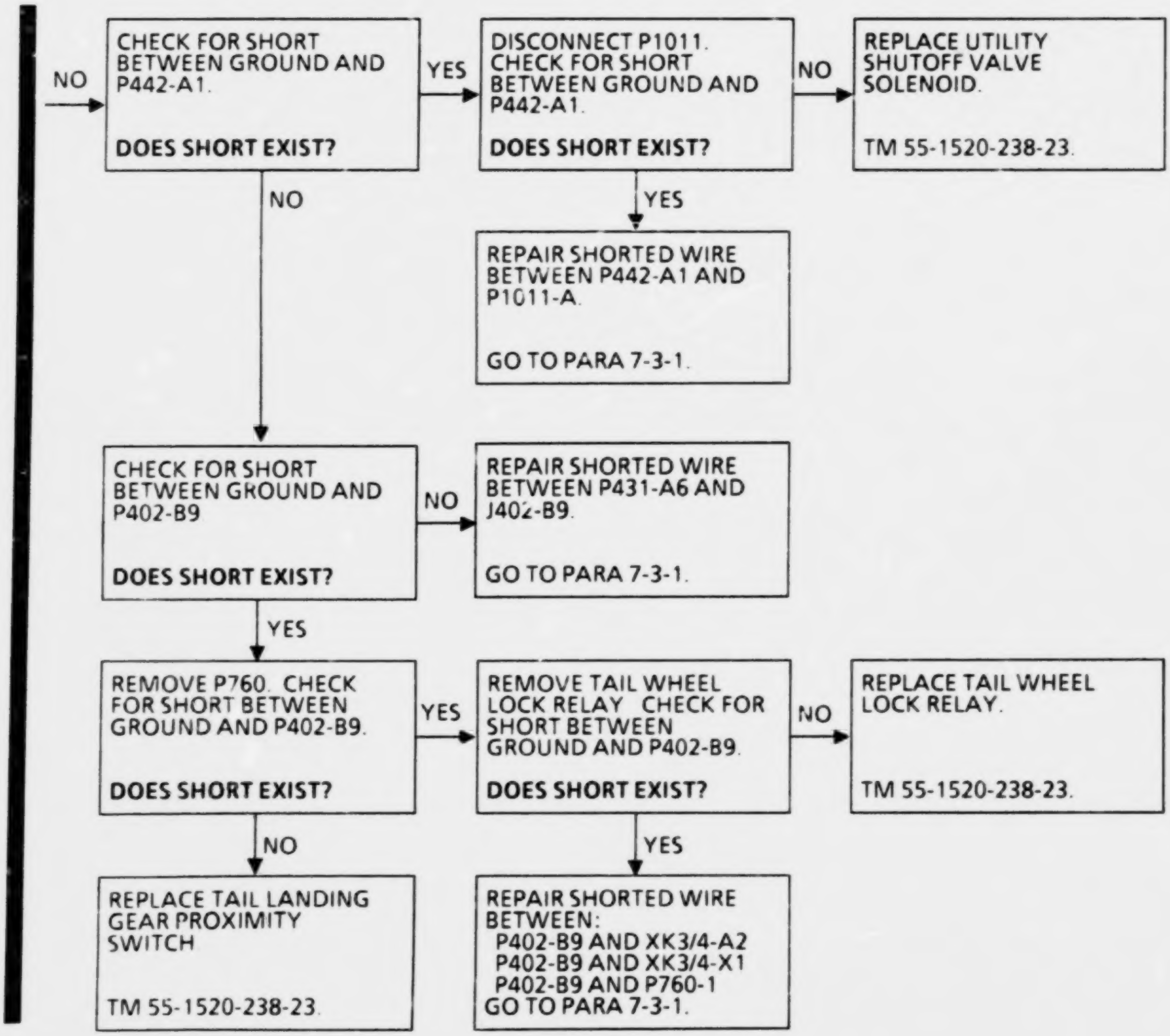
PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-740


OPEN TWHL LOCK CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND A76P1-15. DOES SHORT EXIST?
YES
GO TO PARA 9-22-1 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
NO
TAG AND DISCONNECT WIRES FROM TB2-9-A, -B, -C, -D. CHECK FOR SHORT BETWEEN GROUND AND A402J1-15, J24-A6, J27-A6, J5-A1. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN: A402J1-15 AND TB2-9-D J24-A6 AND TB2-9-A J27-A6 AND TB2-9-B J5-A1 AND TB2-9-C GO TO PARA 7-3-1.
NO
CHECK FOR SHORT BETWEEN GROUND AND P441-A6. DOES SHORT EXIST?
NO
YES
CHECK FOR SHORT BETWEEN GROUND AND P527-A15. DOES SHORT EXIST?
YES
DISCONNECT P754. CHECK FOR SHORT BETWEEN GROUND AND P527-A15. DOES SHORT EXIST?
NO
REPLACE TAIL WHEEL LOCK CONTROL VALVE. TM 55-1520-238-23.
YES
REPAIR SHORTED WIRE BETWEEN P527-A15 AND P754-A. GO TO PARA 7-3-1.
NO
DISCONNECT WIRES FROM S1-2, -3. CHECK FOR SHORT BETWEEN GROUND AND J527-A14, -A15, P527-A14. DOES SHORT EXIST?
NO
REPLACE TAIL WHEEL LOCK SWITCH TM 55-1520-238-23.
YES
REPAIR SHORTED WIRE BETWEEN: J527-A14 AND S1-2 J527-A15 AND S1-3 P527-A14 AND P441-A6 GO TO PARA 7-3-1.

GO TO NEXT PAGE

7-3-19. TWHL LOCK CIRCUIT BREAKER (CB59) DOES NOT STAY CLOSED (cont)



CHECK FOR SHORT BETWEEN GROUND AND P442-A1.

DOES SHORT EXIST?

DISCONNECT P1011. CHECK FOR SHORT BETWEEN GROUND AND P442-A1.

DOES SHORT EXIST?

REPLACE UTILITY SHUTOFF VALVE SOLENOID.

TM 55-1520-238-23.

REPAIR SHORTED WIRE BETWEEN P442-A1 AND P1011-A.

GO TO PARA 7-3-1.

CHECK FOR SHORT BETWEEN GROUND AND P402-B9

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN P431-A6 AND J402-B9.

GO TO PARA 7-3-1.

REMOVE P760. CHECK FOR SHORT BETWEEN GROUND AND P402-B9.

DOES SHORT EXIST?

REMOVE TAIL WHEEL LOCK RELAY CHECK FOR SHORT BETWEEN GROUND AND P402-B9.

DOES SHORT EXIST?

REPLACE TAIL WHEEL LOCK RELAY.

TM 55-1520-238-23.

REPLACE TAIL LANDING GEAR PROXIMITY SWITCH

TM 55-1520-238-23.

REPAIR SHORTED WIRE BETWEEN:
P402-B9 AND XK3/4-A2
P402-B9 AND XK3/4-X1
P402-B9 AND P760-1
GO TO PARA 7-3-1.

END OF TASK

7-3-20. UTIL ACC GAGE DOES NOT INDICATE 3000 PSI

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Service Unit Hydraulic Fluid (T49)	1730-00-102-8665
Caliper, Vernier w/dial, 6 inches long	5210-00-122-5598

Personnel Required:

67R10 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

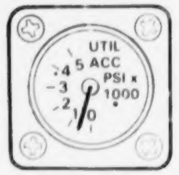
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
Para 1-3-2	ICS connected

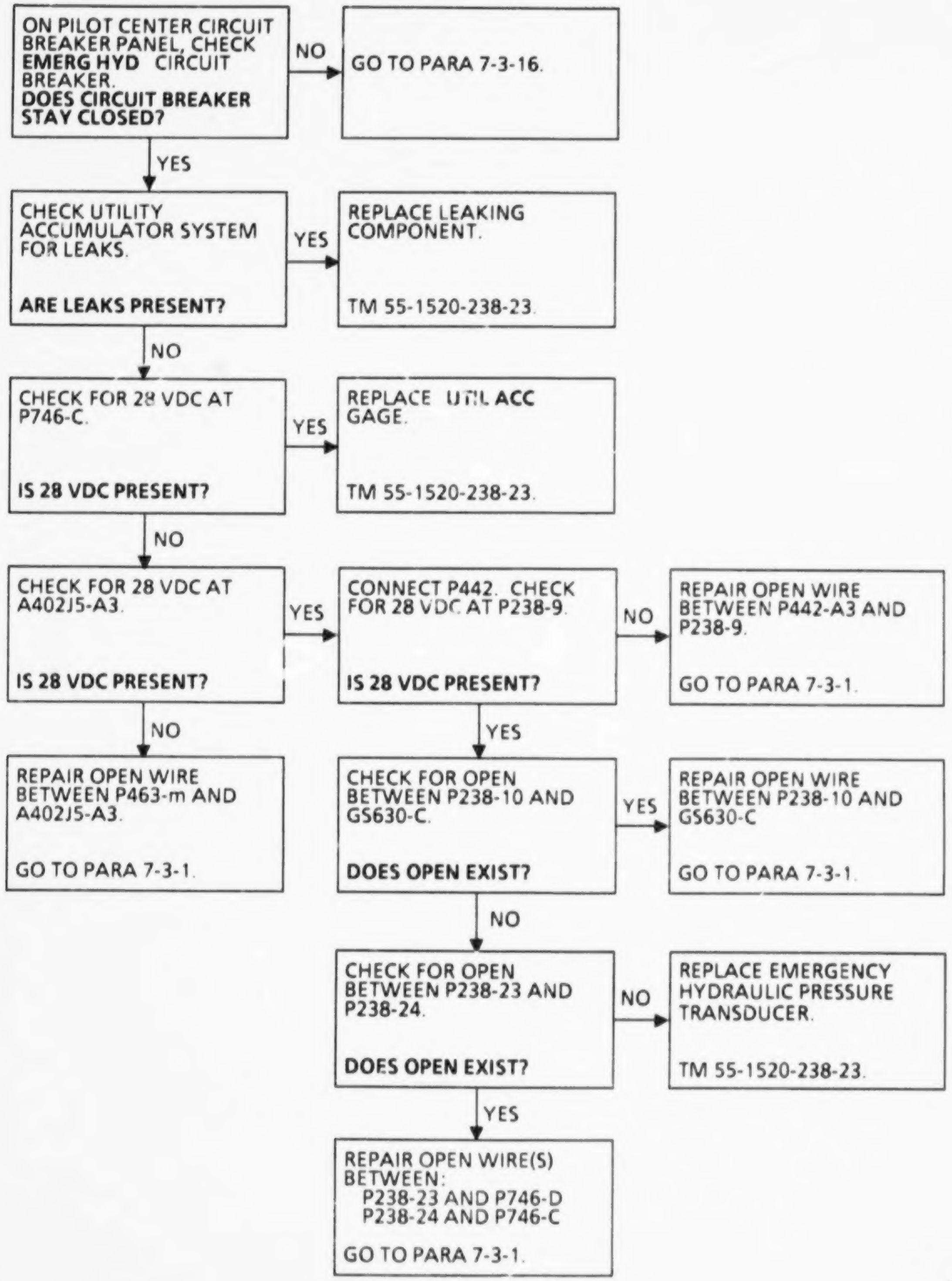
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



UTIL ACC GAGE

MM04/1-753



ON PILOT CENTER CIRCUIT BREAKER PANEL, CHECK **EMERG HYD** CIRCUIT BREAKER.
DOES CIRCUIT BREAKER STAY CLOSED?

GO TO PARA 7-3-16.

CHECK UTILITY ACCUMULATOR SYSTEM FOR LEAKS.
ARE LEAKS PRESENT?

REPLACE LEAKING COMPONENT.
TM 55-1520-238-23.

CHECK FOR 28 VDC AT P746-C.
IS 28 VDC PRESENT?

REPLACE **UTIL ACC** GAGE.
TM 55-1520-238-23.

CHECK FOR 28 VDC AT A402J5-A3.
IS 28 VDC PRESENT?

CONNECT P442. CHECK FOR 28 VDC AT P238-9.
IS 28 VDC PRESENT?

REPAIR OPEN WIRE BETWEEN P442-A3 AND P238-9.
GO TO PARA 7-3-1.

REPAIR OPEN WIRE BETWEEN P463-m AND A402J5-A3.
GO TO PARA 7-3-1.

CHECK FOR OPEN BETWEEN P238-10 AND GS630-C.
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN P238-10 AND GS630-C
GO TO PARA 7-3-1.

CHECK FOR OPEN BETWEEN P238-23 AND P238-24.
DOES OPEN EXIST?

REPLACE EMERGENCY HYDRAULIC PRESSURE TRANSDUCER.
TM 55-1520-238-23.

REPAIR OPEN WIRE(S) BETWEEN:
P238-23 AND P746-D
P238-24 AND P746-C
GO TO PARA 7-3-1.

END OF TASK

7-3-21. UTIL ACC PSI X1000 INDICATOR EDGE LIGHT DOES NOT COME ON

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

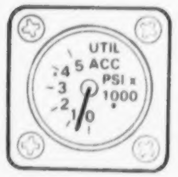
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

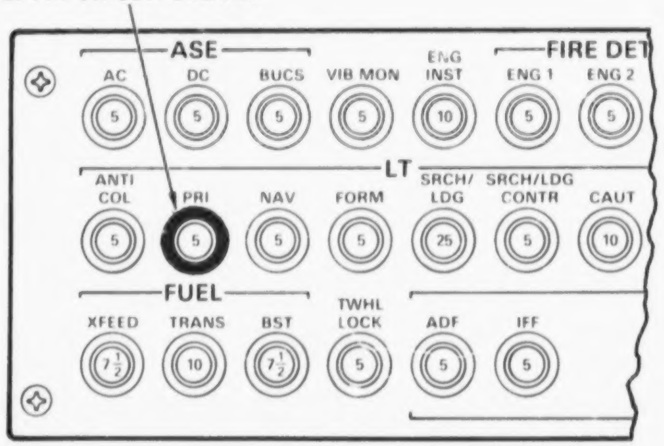
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


UTIL ACC PSI x 1000
5
4
3
2
1
0

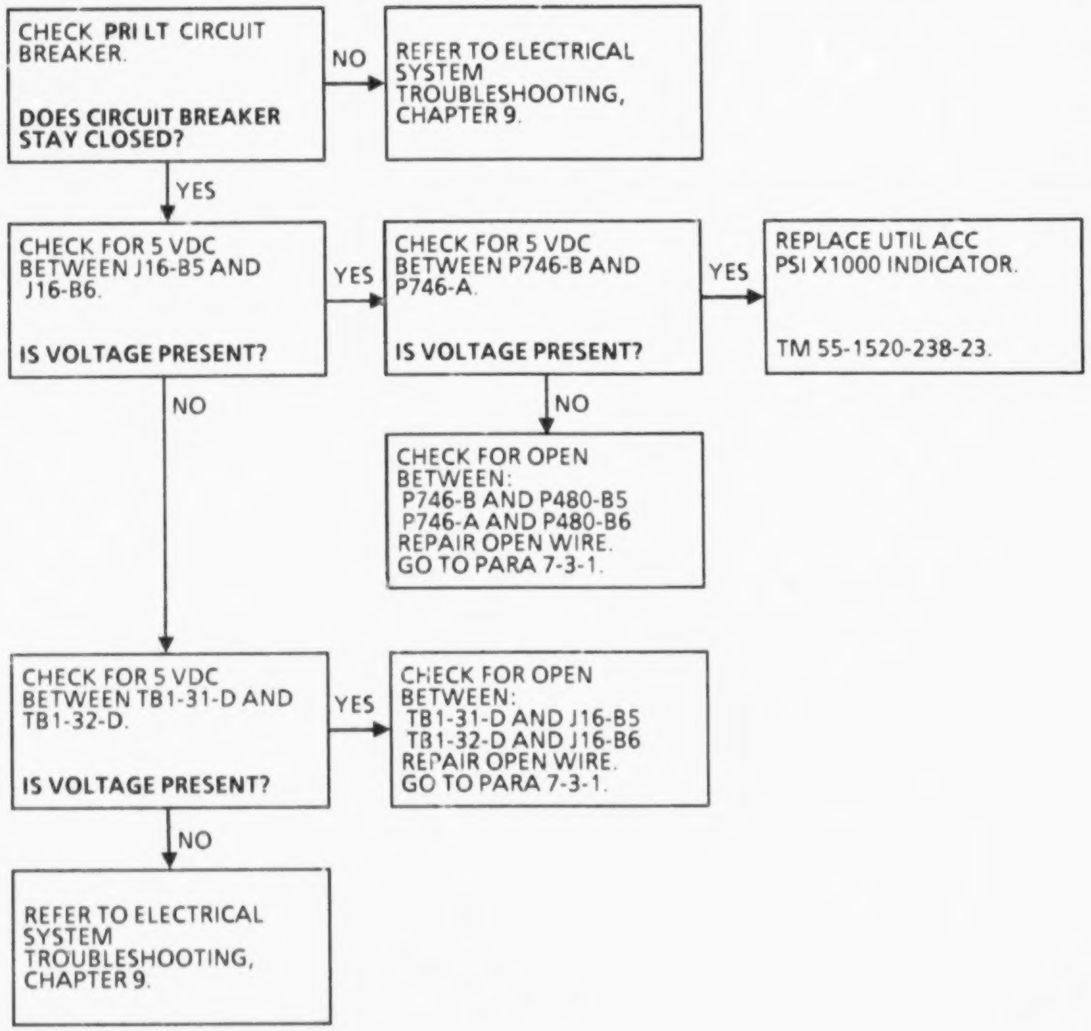
UTIL ACC PS1 X 1000 INDICATOR

LT PRI CIRCUIT BREAKER


ASE
AC
DC
BUCS
VIB MON
ENG INST
FIRE DET
ENG 1
ENG 2
5
5
5
5
10
5
5
LT
ANTI COL
PRI
NAV
FORM
SRCH/ LDG
SRCH/LDG CONTR
CAUT
5
5
5
5
25
5
10
FUEL
XFEED
TRANS
BST
TWHL LOCK
ADF
IFF
7½
10
7½
5
5
5

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-793A


CHECK PRI LT CIRCUIT BREAKER.
DOES CIRCUIT BREAKER STAY CLOSED?
NO
REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.
YES
CHECK FOR 5 VDC BETWEEN J16-B5 AND J16-B6.
IS VOLTAGE PRESENT?
YES
CHECK FOR 5 VDC BETWEEN P746-B AND P746-A.
IS VOLTAGE PRESENT?
YES
REPLACE UTIL ACC PSI X1000 INDICATOR.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P746-B AND P480-B5 P746-A AND P480-B6 REPAIR OPEN WIRE. GO TO PARA 7-3-1.
NO
CHECK FOR 5 VDC BETWEEN TB1-31-D AND TB1-32-D.
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN: TB1-31-D AND J16-B5 TB1-32-D AND J16-B6 REPAIR OPEN WIRE. GO TO PARA 7-3-1.
NO
REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

END OF TASK

7-3-22. TAIL WHEEL LOCK PANEL EDGE LIGHT - IS NOT LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

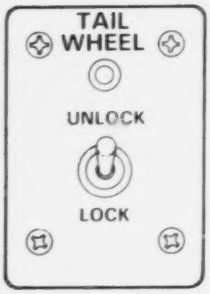
TM 55-1520-238-23

Equipment Conditions:

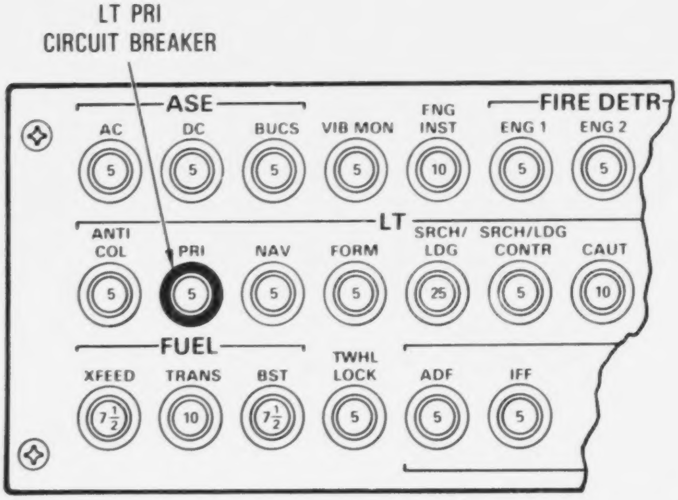
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

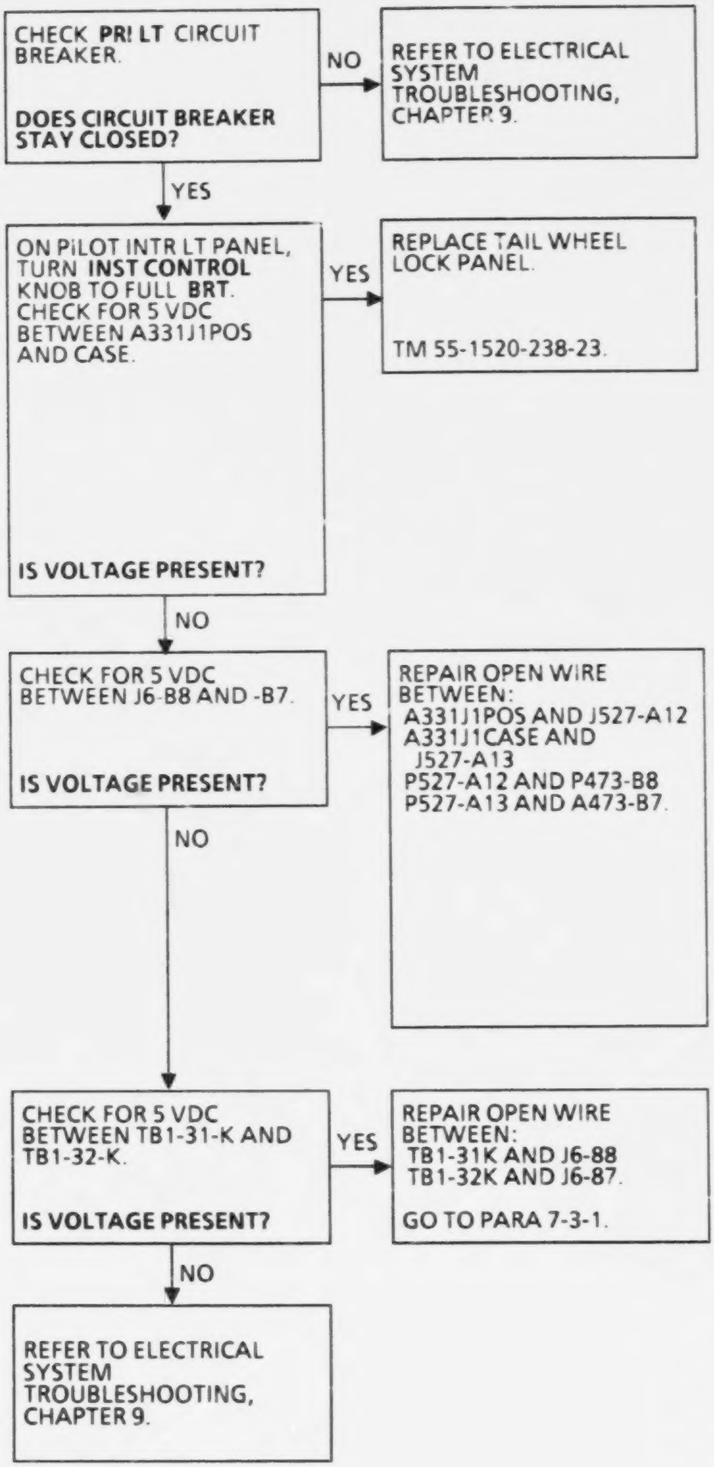

TAIL WHEEL
UNLOCK
LOCK

TAIL WHEEL LOCK PANEL


LT PRI CIRCUIT BREAKER
ASE
AC
5
DC
5
BUCS
5
VIB MON
5
ENG INST
10
FIRE DETR
ENG 1
5
ENG 2
5
LT
ANTI COL
5
PRI
5
NAV
5
FORM
5
SRCH/LDG
25
SRCH/LDG CONTR
5
CAUT
10
FUEL
XFEED
7½
TRANS
10
BST
7½
TWHL LOCK
5
ADF
5
IFF
5

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-795



CHECK **PRI LT** CIRCUIT BREAKER.

DOES CIRCUIT BREAKER STAY CLOSED?

REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

ON PILOT INTR LT PANEL, TURN **INST CONTROL** KNOB TO FULL **BRT**. CHECK FOR 5 VDC BETWEEN A331J1POS AND CASE.

IS VOLTAGE PRESENT?

REPLACE TAIL WHEEL LOCK PANEL.

TM 55-1520-238-23.

CHECK FOR 5 VDC BETWEEN J6-B8 AND -B7.

IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN:
A331J1POS AND J527-A12
A331J1CASE AND J527-A13
P527-A12 AND P473-B8
P527-A13 AND A473-B7.

CHECK FOR 5 VDC BETWEEN TB1-31-K AND TB1-32-K.

IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN:
TB1-31K AND J6-88
TB1-32K AND J6-87.

GO TO PARA 7-3-1.

REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

END OF TASK

7-3-23. EMERGENCY HYDRAULIC POWER EDGE LIGHT - IS NOT LIGHTED

Tools: (para 7-3-22)

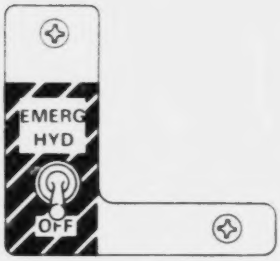
Personnel Required: (para 7-3-22)

References: (para 7-3-22)

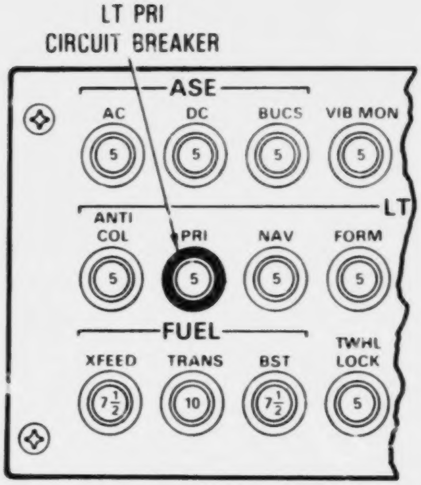
Equipment Conditions: (para 7-3-22)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

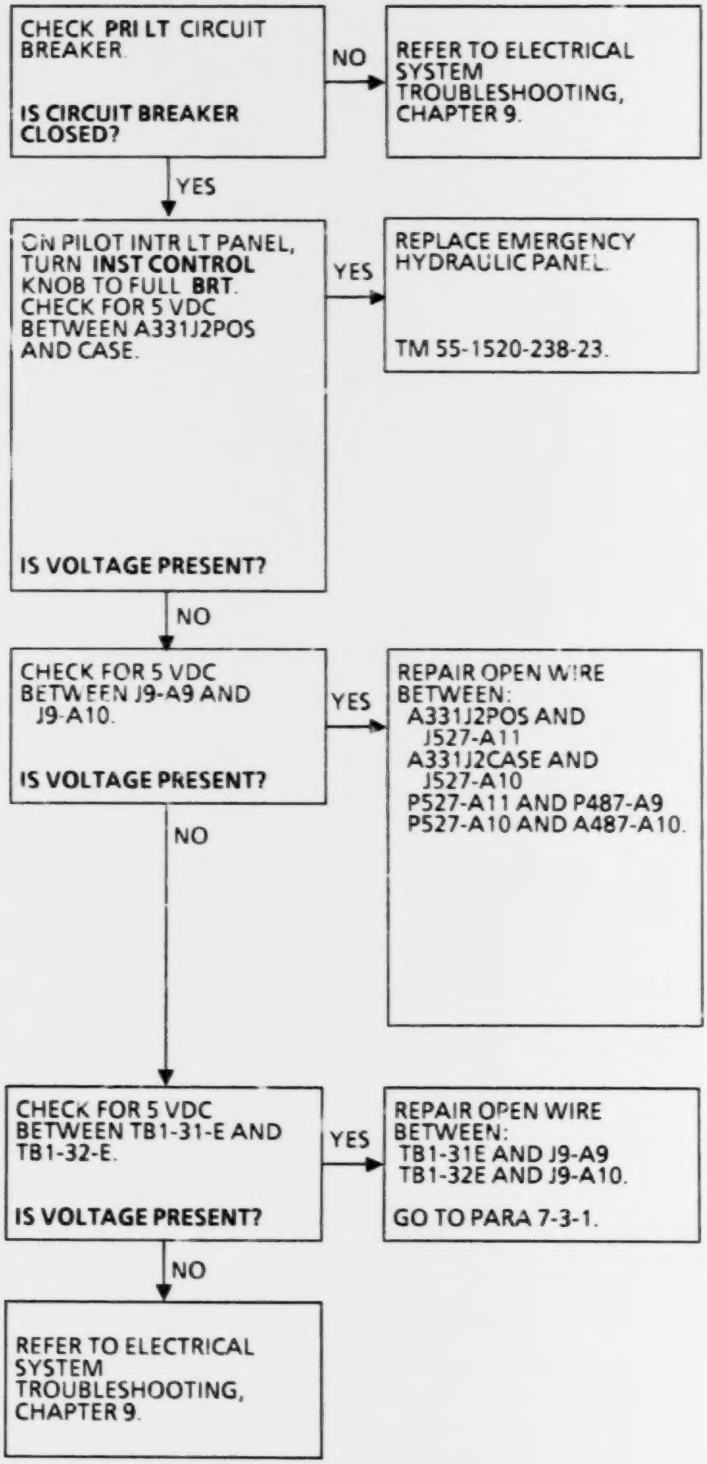

EMERG
HYD
OFF

EMERG HYD PWR PANEL


LT PRI
CIRCUIT BREAKER
ASE
AC
DC
BUCS
VIB MON
5
5
5
5
LT
ANTI COL
PRI
NAV
FORM
5
5
5
5
FUEL
XFEED
TRANS
BST
TWHL LOCK
7½
10
7½
5

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-795



CHECK **PRI LT** CIRCUIT BREAKER.

IS CIRCUIT BREAKER CLOSED?

REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

ON PILOT INTR LT PANEL, TURN **INST CONTROL** KNOB TO FULL **BRT**. CHECK FOR 5 VDC BETWEEN A331J2POS AND CASE.

IS VOLTAGE PRESENT?

REPLACE EMERGENCY HYDRAULIC PANEL.

TM 55-1520-238-23.

CHECK FOR 5 VDC BETWEEN J9-A9 AND J9-A10.

IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN:
A331J2POS AND J527-A11
A331J2CASE AND J527-A10
P527-A11 AND P487-A9
P527-A10 AND A487-A10.

CHECK FOR 5 VDC BETWEEN TB1-31-E AND TB1-32-E.

IS VOLTAGE PRESENT?

REPAIR OPEN WIRE BETWEEN:
TB1-31E AND J9-A9
TB1-32E AND J9-A10.

GO TO PARA 7-3-1.

REFER TO ELECTRICAL SYSTEM TROUBLESHOOTING, CHAPTER 9.

END OF TASK

7-3-24. OIL PSI UTIL HYD CAUTION LIGHT - IS NOT ON WITH NO UTILITY HYDRAULIC SYSTEM PRESSURE INDICATED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

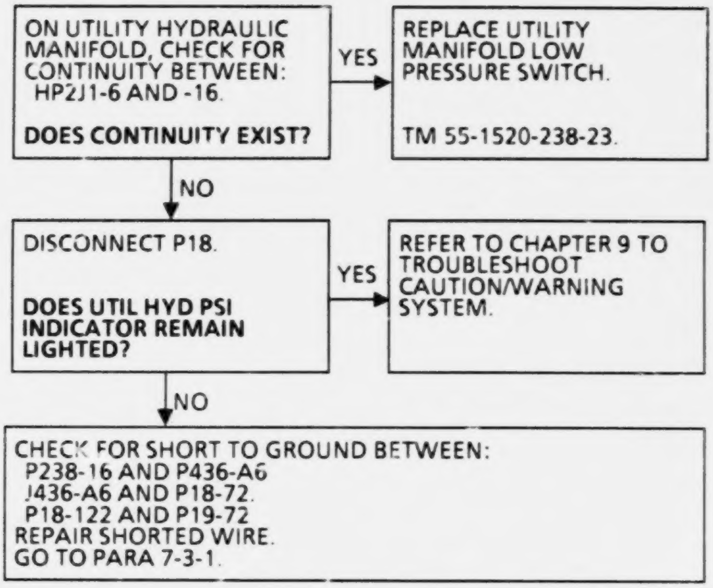
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Access provisions - L200 panel removed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON UTILITY HYDRAULIC MANIFOLD, CHECK FOR CONTINUITY BETWEEN:
HP2J1-6 AND -16.

DOES CONTINUITY EXIST?

REPLACE UTILITY MANIFOLD LOW PRESSURE SWITCH.

TM 55-1520-238-23.

DISCONNECT P18.

DOES UTIL HYD PSI INDICATOR REMAIN LIGHTED?

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION/WARNING SYSTEM.

CHECK FOR SHORT TO GROUND BETWEEN:
P238-16 AND P436-A6
J436-A6 AND P18-72.
P18-122 AND P19-72
REPAIR SHORTED WIRE.
GO TO PARA 7-3-1.

END OF TASK

7-4-1. PRESSURIZED AIR SYSTEM - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Cord Assembly, Electrical-Maintenance Microphone (2)	5995-01-163-9549

Personnel Required:

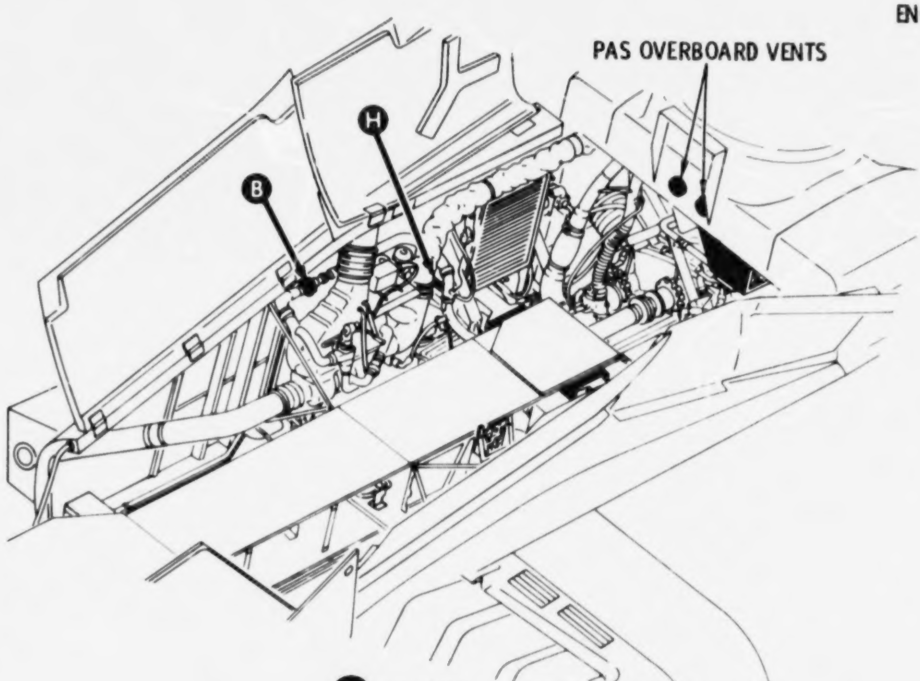
67R20	Attack Helicopter Repairer
67R10	Attack Helicopter Repairer
100KG	Pilot

References:

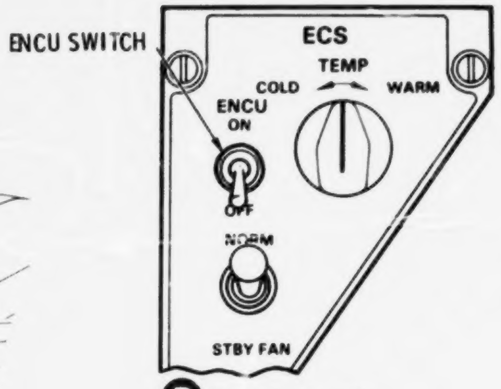
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

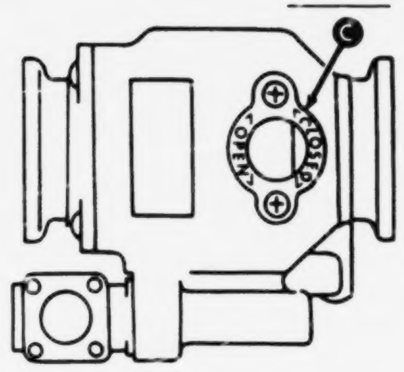
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical - Pressurized air
Para 1-3-2	ICS connected


PAS OVERBOARD VENTS
B
H

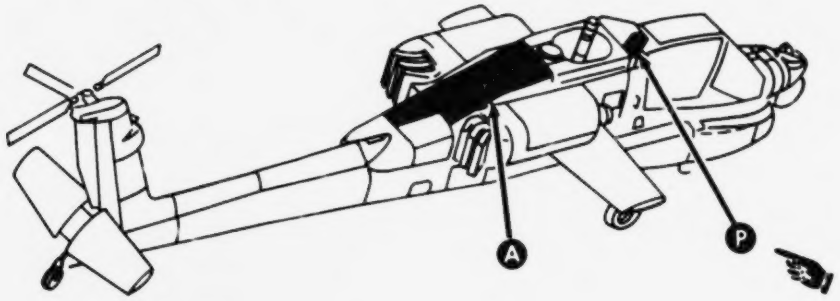
A AFT DECK

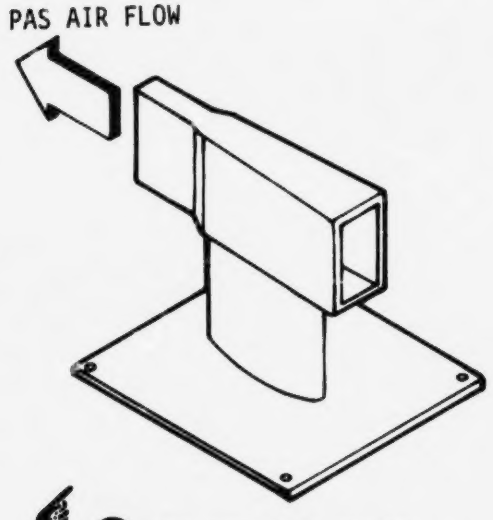

ENCU SWITCH
ECS
TEMP
COLD
WARM
ENCU
ON
OFF
NORM
STBY FAN

D PILOT ECS PANEL

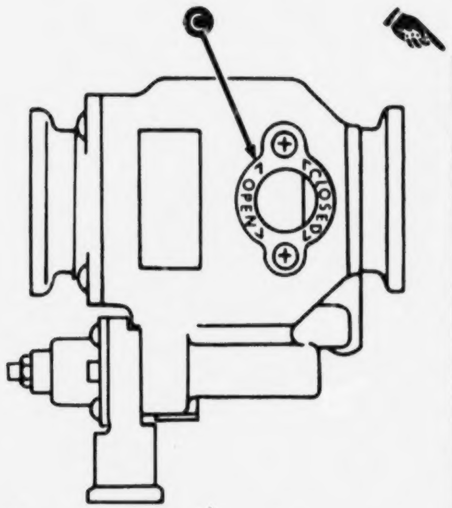

C
CLOSED
OPEN

B ENCU SHUTOFF VALVE

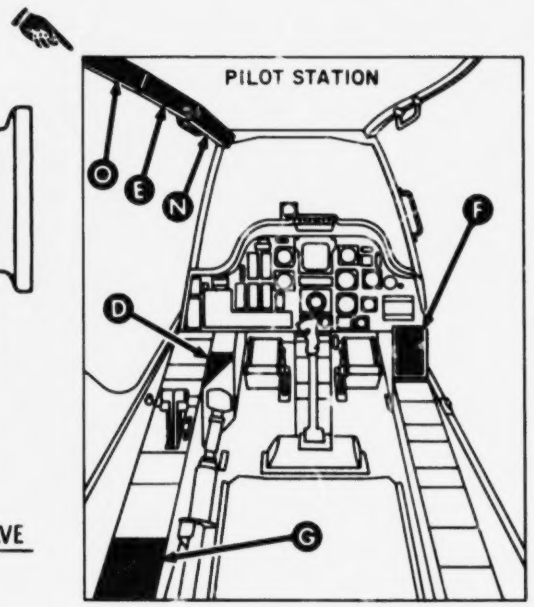


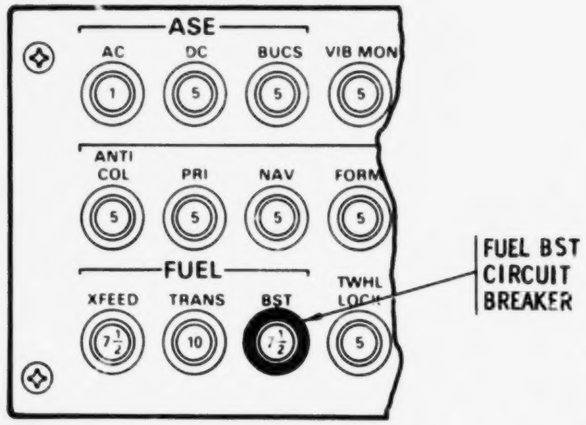

PAS AIR FLOW

P ICE DETECTOR SENSOR


C
CLOSED
OPEN

H ENGINE BLEED AIR SHUTOFF VALVE


PILOT STATION
O
E
N
F
D
G


ASE
AC
DC
BUCS
VIB MON
1
5
5
5
ANTI COL
PRI
NAV
FORM
5
5
5
5
FUEL
XFEED
TRANS
BST
TWHL LOCK
7½
10
7½
5
FUEL BST CIRCUIT BREAKER

E PILOT CENTER CIRCUIT BREAKER PANEL

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GO TO NEXT PAGE

7-4-1. PRESSURIZED AIR SYSTEM - OPERATIONAL CHECK (cont)

WARNING

Make sure all helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting and maintenance operations. Failure to do so could result in death or serious injury. If injury occurs,get medical aid immediately.

A. Check to ensure that bleed air shutoff valve indicator is in the **CLOSED** position. If valve indicator is in **OPEN** position, replace bleed air shutoff valve (TM 55-1520-238-23).

B. Perform External Power Application-Pressurized Air (TM 55-1520-238-23).

C. Perform visual check of pressurized air system, main transmission, and APU. If any damage or leakage is found, repair leaking/damaged component. If air flow is present at shaft driven compressor (SDC) overboard exhaust, replace SDC check valve (TM 55-1520-238-23).

D. Remove external power application - Pressurized Air (TM 55-1520-238-23).

WARNING

Pressurized air system components get hot during operation, to prevent possible burns, avoid touching hot surfaces. If injury occurs seek medical aid immediately.

E. Check to ensure that bleed air shutoff valve indicator is in the **CLOSED** position. If valve indicator is in **OPEN** position, replace bleed air shutoff valve (TM 55-1520-238-23).

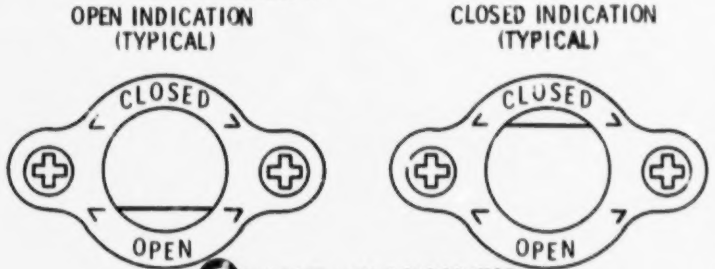
F. Complete operational check as follows:

TASK	RESULT
1. With **ENCU** switch on pilot **ECS** panel set to **OFF**, start/operate APU (TM 55-1520-238-CL). On pilot center circuit breaker panel, check **FUEL BST** circuit breaker stays closed. **SHAFT DRIVEN COMP** indicator remains lighted approximately 60 seconds after APU start.	If **FUEL BST** circuit breaker does not stay closed, go to para 7-4-9. If **SHAFT DRIVEN COMP** indicator is not lighted for approximately 60 seconds after APU start, go to para 7-4-5. If **SHAFT DRIVEN COMP** indicator remains lighted longer than approximately 60 seconds after APU start, go to para 7-4-6. If APU fails to start, refer to Chapter 15 to troubleshoot APU.

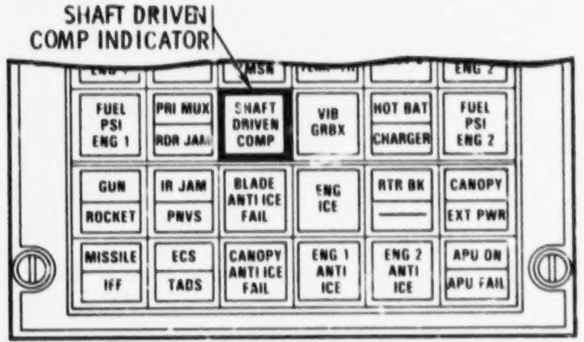
WARNING

APU is operating. To prevent injury to personnel, avoid contact with rotating components and high pressure air discharge. Secure any loose clothing and personal articles. Failure to do so could result in death or serious injury. If injury occurs, get medical aid immediately.

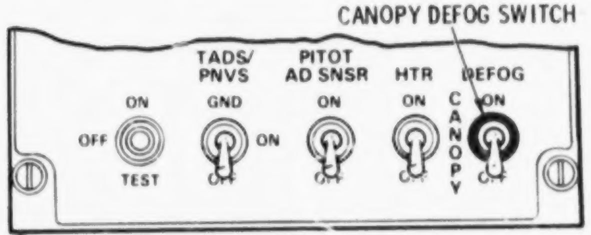
TASK	RESULT
2. On aft deck, check for pulsing air discharge from PAS overboard vent.	If loud banging sound (surge) is heard, immediately shut down APU (TM 55-1520-238-CL) and replace SDC (TM 55-1520-238-23).
3. On pilot ECS panel, set **ENCU** switch to **ON**. Air flows from ECS vents.	If air does not flow from ECS vents, have assistant check ENCU shutoff valve indicator on aft deck. If valve indicates **OPEN**, replace SDC (TM 55-1520-238-23). If valve indicates **CLOSED**, refer to chapter 13 to troubleshoot ECS.
4. On pilot **ANTI-ICE** panel, set **CANOPY DEFOG** switch to **ON**. Air flows from defog air mixers.	If air does not flow from defog air mixers, refer to chapter 12 to troubleshoot anti-ice system.
5. Set **CANOPY DEFOG** switch to **OFF**. Air stops flowing from defog air mixers.	If air does not stop flowing from defog air mixers, refer to chapter 12 to troubleshoot anti-ice system.


OPEN INDICATION (TYPICAL)
CLOSED INDICATION (TYPICAL)
CLOSED
OPEN
CLOSED
OPEN

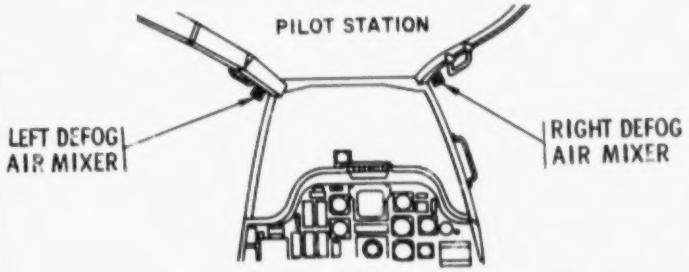
C SHUTOFF VALVE INDICATOR


SHAFT DRIVEN COMP INDICATOR
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

F PILOT CAUTION/WARNING PANEL


CANOPY DEFOG SWITCH
TADS/ PNVS
PITOT AD SNSR
HTR
DEFOG
ON
OFF
TEST
GND
ON
OFF
ON
OFF
ON
OFF
CANOPY
ON
OFF

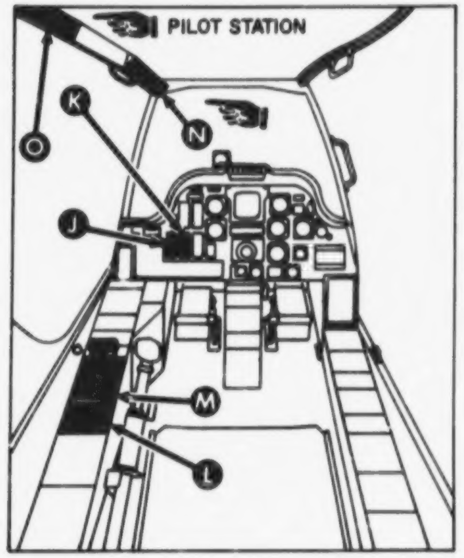
G PILOT ANTI ICE PANEL

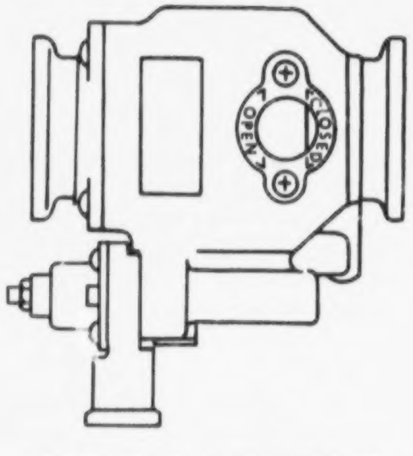

PILOT STATION
LEFT DEFOG AIR MIXER
RIGHT DEFOG AIR MIXER

MM04/1-816-2B

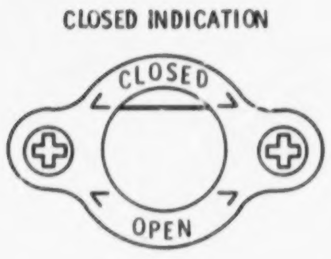
GO TO NEXT PAGE

7-4-1. PRESSURIZED AIR SYSTEM - OPERATIONAL CHECK (cont)

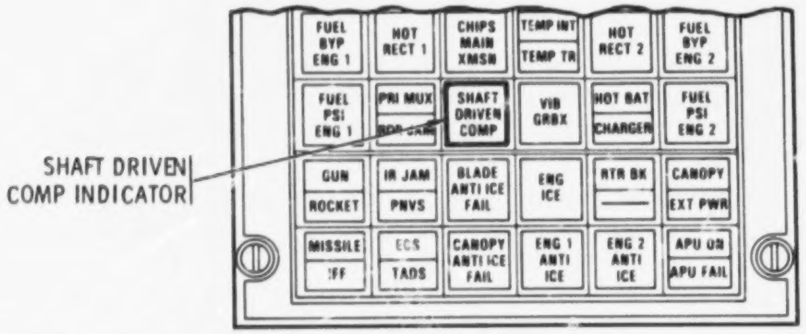

PILOT STATION
O
K
N
J
M
L


OPEN
CLOSED

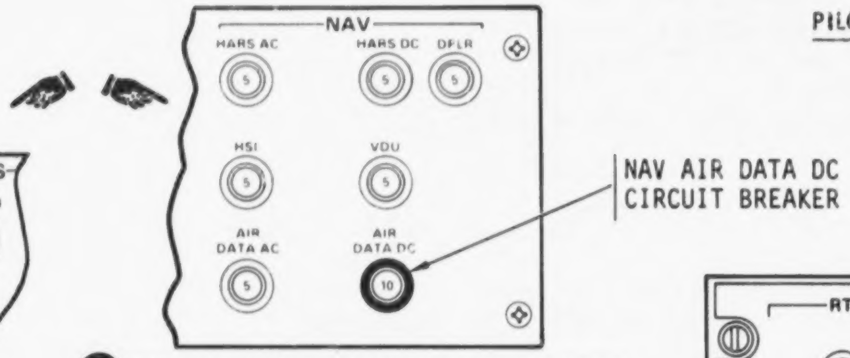
ENGINE BLEED AIR SHUTOFF VALVE


CLOSED INDICATION
CLOSED
OPEN

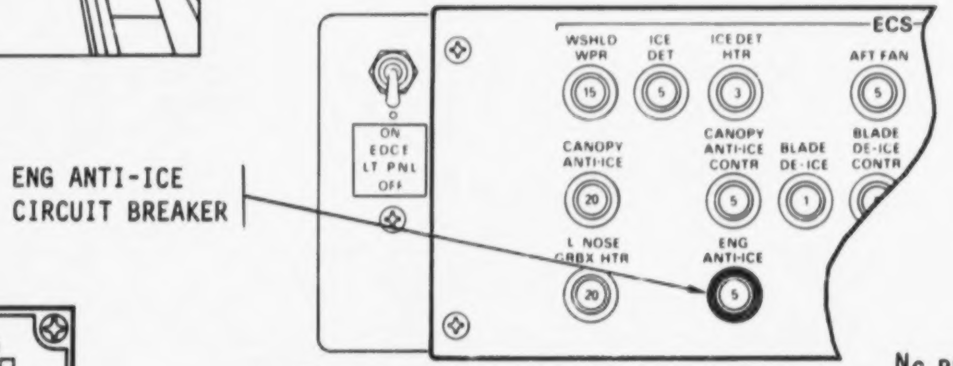
SHUTOFF VALVE INDICATOR


SHAFT DRIVEN COMP INDICATOR
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

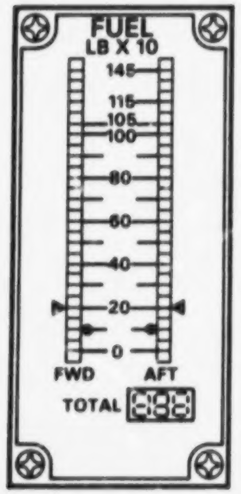
PILOT CAUTION/WARNING PANEL


NAV
HARS AC
HARS DC
DFLR
HSI
VDU
AIR DATA AC
AIR DATA DC
NAV AIR DATA DC CIRCUIT BREAKER

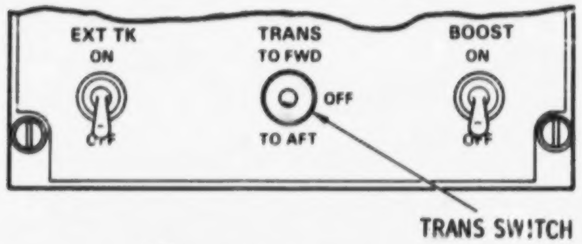
N PILOT FORWARD CIRCUIT BREAKER PANEL


ECS
WSHLD WPR
ICE DET
ICE DET HTR
AFT FAN
CANOPY ANTI-ICE
CANOPY ANTI-ICE CONTR
BLADE DE-ICE
BLADE DE-ICE CONTR
L NOSE GRBX HTR
ENG ANTI-ICE
ON
EDGE LT PNL
OFF
ENG ANTI-ICE CIRCUIT BREAKER

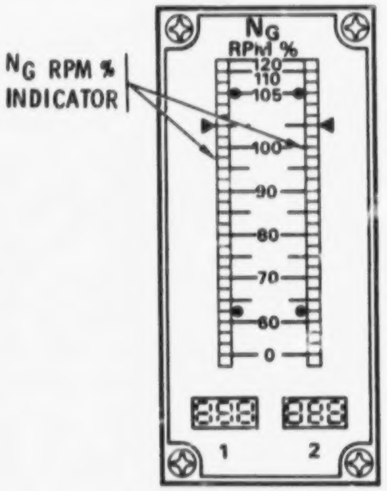
O PILOT AFT CIRCUIT BREAKER PANEL


FUEL
LB X 10
145
115
105
100
80
60
40
20
0
FWD
AFT
TOTAL

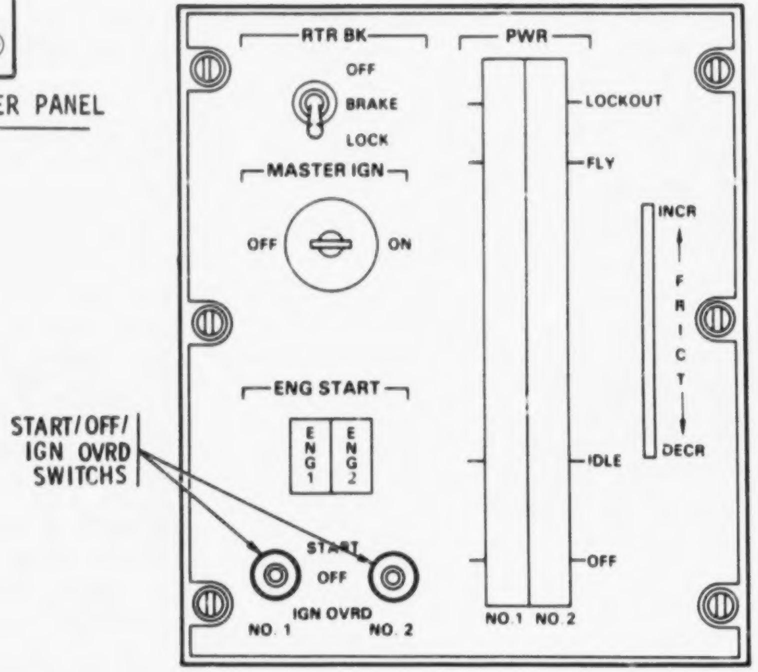
J PILOT FUEL LB X 10 INDICATOR


EXT TK
ON
OFF
TRANS
TO FWD
OFF
TO AFT
BOOST
ON
OFF
TRANS SWITCH

L PILOT FUEL PANEL


NG RPM % INDICATOR
NG
RPM %
120
110
105
100
90
80
70
60
0
1
2

K PILOT NG RPM% INDICATOR


RTR BK
OFF
BRAKE
LOCK
MASTER IGN
OFF
ON
ENG START
ENG 1
ENG 2
START
OFF
IGN OVRD
NO. 1
NO. 2
PWR
LOCKOUT
FLY
IDLE
OFF
NO.1
NO.2
INCR
FRICT
DECR
START/OFF/IGN OVRD SWITCHS

M PILOT POWER LEVER QUADRANT

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GO TO NEXT PAGE

7-4-1. PRESSURIZED AIR SYSTEM - OPERATIONAL CHECK (cont)

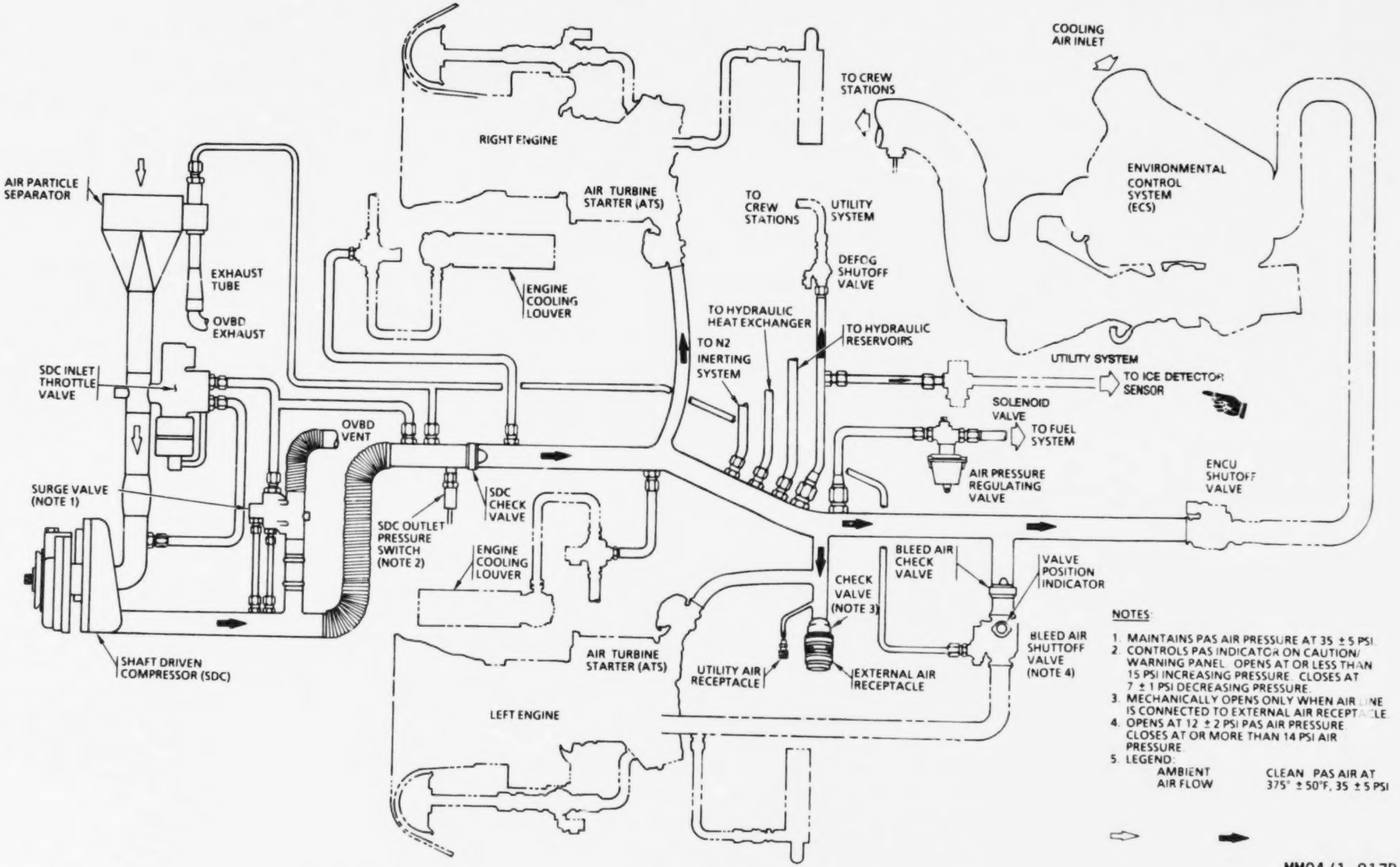
TASK	RESULT
5a. On pilot **ANTI-ICE** panel, set **PITOT ICE DET AD SNSR** switch to **ON**. Air flows from rear of ice detector sensor located on doghouse fairing.	If air does not flow from ice detector sensor refer to chapter 12 to troubleshoot anti-ice system.
5b. On pilot **ANTI-ICE** panel, set **PITOT ICE DET AD SNSR** switch to **OFF**. Air flow from ice detector sensor stops.	If air flows from ice detector sensor refer to chapter 12 to troubleshoot anti-ice system.
6. On pilot INSTRUMENT PANEL, check **FUEL LBX10** indicator. Note fuller tank.	If **FUEL LBX10** indicator shows both tanks **FULL**, go to step 9 below.
7. On pilot **FUEL** panel, position **TRANS** switch as required to transfer fuel from fuller tank noted in step 6, above. **FUEL LBX10** indicator shows fuel transfer.	If **FUEL LBX10** indicator does not show fuel transfer, have assistant check for airflow at utility hydraulic heat exchanger outlet. If airflow is present, go to fuel system trouble shooting, chapter 10. If airflow is not present, locate and repair broken PAS manifold, or replace air pressure regulation valve (TM 55-1520-238-23).
8. On pilot **FUEL** panel, set **TRANS** switch to **OFF**.	
9. Deleted	
10. Secure access doors T250L, T250R, T290L, T290R and L325 (TM 55-1520-238-23).	
11. On pilot power lever quadrant, set **NO. 1 START/OFF/IGN OVRD** switch to **IGN OVRD**.	
12. On pilot instrument panel, check that **N_G RPM%** digital indicator 1 stabilizes at 22% minimum.	If **N_G RPM%** digital indicator 1 does not stabilize at 22% minimum, refer to chapter 4 to troubleshoot no. 1 engine air turbine starter.
13. Repeat steps 10 and 11 for no. 2 engine.	If **NG RPM%** digital indicator 2 does not stabilize at 22% minimum, refer to chapter 4 to troubleshoot no. 2 engine air turbine starter.
14. Start/operate no. 1 engine (TM 55-1520-238-CL).	If loud banging sound is heard, refer to chapter 4 to troubleshoot ECS time delay relay. If no. 1 engine does not start, refer to chapter 4 to troubleshoot no. 1 engine.

TASK	RESULT
15. With no. 1 engine operating, open **FUEL BST** circuit breaker on pilot center circuit breaker panel. Check for noticable reduction of ECS airflow.	If ECS airflow is not reduced, go to para 7-4-7. If PAS manifold loses pressure, replace bleed air shutoff valve (TM 55-1520-238-23).
16. With **FUEL BST** circuit breaker open, transfer fuel back to original levels as in step 6 above. **FUEL LBX10** indicator shows transfer.	If **FUEL LBX10** indicator does not show transfer, go to para 7-4-8.
17. On pilot center circuit breaker panel, close **FUEL BST** circuit breaker. On pilot caution/warning panel, **SHAFT DRIVEN COMP** indicator is not lighted.	If **SHAFT DRIVEN COMP** indicator is lighted, go to para 7-4-6.
18. Shut down no. 1 engine (TM 55-1520-238-CL).	
19. On aft deck, perform visual inspection of PAS components.	If PAS components are leaking, or appear damaged, replace (TM 55-1520-238-23).

E. Shut down APU (TM 55-1520-238-CL).

F. Secure access doors R200, T250L, T290L, T290R, L325, and LN1 (TM 55-1520-238-23).

7-4-2. PRESSURIZED AIR SYSTEM DIAGRAM


COOLING AIR INLET
TO CREW STATIONS
RIGHT ENGINE
ENVIRONMENTAL CONTROL SYSTEM (ECS)
AIR PARTICLE SEPARATOR
AIR TURBINE STARTER (ATS)
TO CREW STATIONS
UTILITY SYSTEM
EXHAUST TUBE
ENGINE COOLING LOUVER
DEFOG SHUTOFF VALVE
OVBD EXHAUST
TO HYDRAULIC HEAT EXCHANGER
TO HYDRAULIC RESERVOIRS
TO N2 INERTING SYSTEM
UTILITY SYSTEM
SDC INLET THROTTLE VALVE
TO ICE DETECTOR SENSOR
SOLENOID VALVE
TO FUEL SYSTEM
OVBD VENT
AIR PRESSURE REGULATING VALVE
ENCU SHUTOFF VALVE
SURGE VALVE (NOTE 1)
SDC CHECK VALVE
SDC OUTLET PRESSURE SWITCH (NOTE 2)
ENGINE COOLING LOUVER
BLEED AIR CHECK VALVE
CHECK VALVE (NOTE 3)
VALVE POSITION INDICATOR
BLEED AIR SHUTTOFF VALVE (NOTE 4)
SHAFT DRIVEN COMPRESSOR (SDC)
AIR TURBINE STARTER (ATS)
UTILITY AIR RECEPTACLE
EXTERNAL AIR RECEPTACLE
LEFT ENGINE

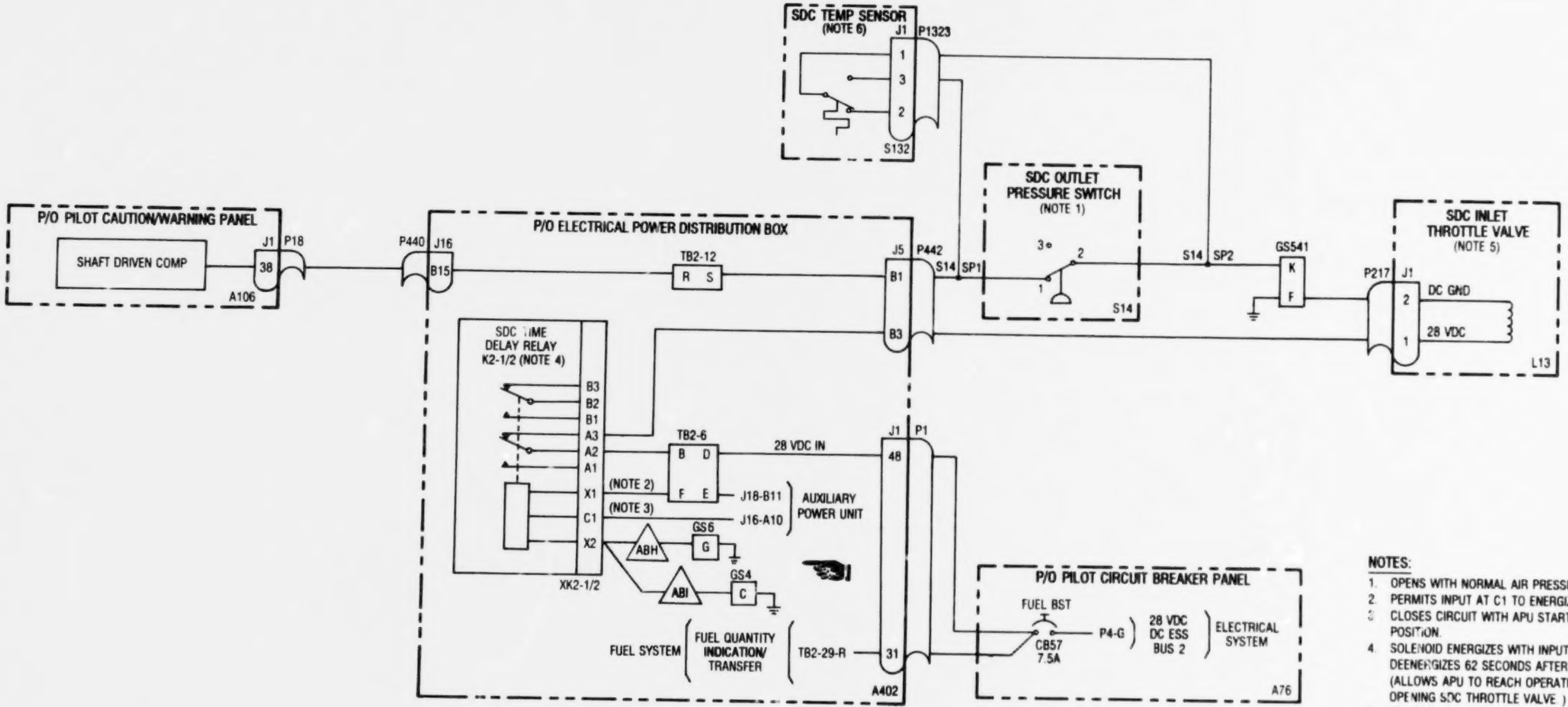
NOTES:

1. MAINTAINS PAS AIR PRESSURE AT 35 ± 5 PSI.
2. CONTROLS PAS INDICATOR ON CAUTION/WARNING PANEL. OPENS AT OR LESS THAN 15 PSI INCREASING PRESSURE. CLOSES AT 7 ± 1 PSI DECREASING PRESSURE.
3. MECHANICALLY OPENS ONLY WHEN AIR LINE IS CONNECTED TO EXTERNAL AIR RECEPTACLE.
4. OPENS AT 12 ± 2 PSI PAS AIR PRESSURE. CLOSES AT OR MORE THAN 14 PSI AIR PRESSURE.
5. LEGEND:

AMBIENT AIR FLOW	CLEAN PAS AIR AT 375° ± 50°F, 35 ± 5 PSI
⇨	➡

MM04/1-817B

7-4-3. PRESSURIZED AIR SYSTEM - INTERCONNECTION DIAGRAM

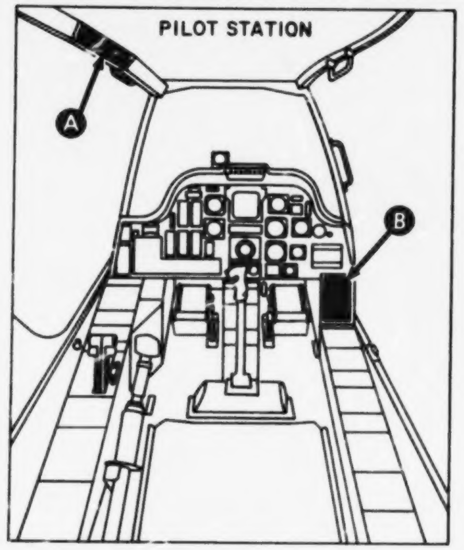

SDC TEMP SENSOR
(NOTE 6)
J1
P1323
1
3
2
S132
P/O PILOT CAUTION/WARNING PANEL
SHAFT DRIVEN COMP
J1
P18
38
A106
P440
J16
B15
P/O ELECTRICAL POWER DISTRIBUTION BOX
TB2-12
R S
J5
P442
B1
B3
S14
SP1
SDC OUTLET
PRESSURE SWITCH
(NOTE 1)
3
2
1
S14
S14
SP2
GS541
K
F
SDC INLET
THROTTLE VALVE
(NOTE 5)
P217
J1
2
1
DC GND
28 VDC
L13
SDC TIME
DELAY RELAY
K2-1/2 (NOTE 4)
B3
B2
B1
A3
A2
A1
X1
C1
X2
XK2-1/2
TB2-6
B D
F E
28 VDC IN
(NOTE 2)
(NOTE 3)
J18-B11
J16-A10
AUXILIARY
POWER UNIT
ABH
GS6
G
ABI
GS4
C
J1
P1
48
31
FUEL SYSTEM
FUEL QUANTITY
INDICATION/
TRANSFER
TB2-29-R
A402
P/O PILOT CIRCUIT BREAKER PANEL
FUEL BST
CB57
7.5A
P4-G
28 VDC
DC ESS
BUS 2
ELECTRICAL
SYSTEM
A76

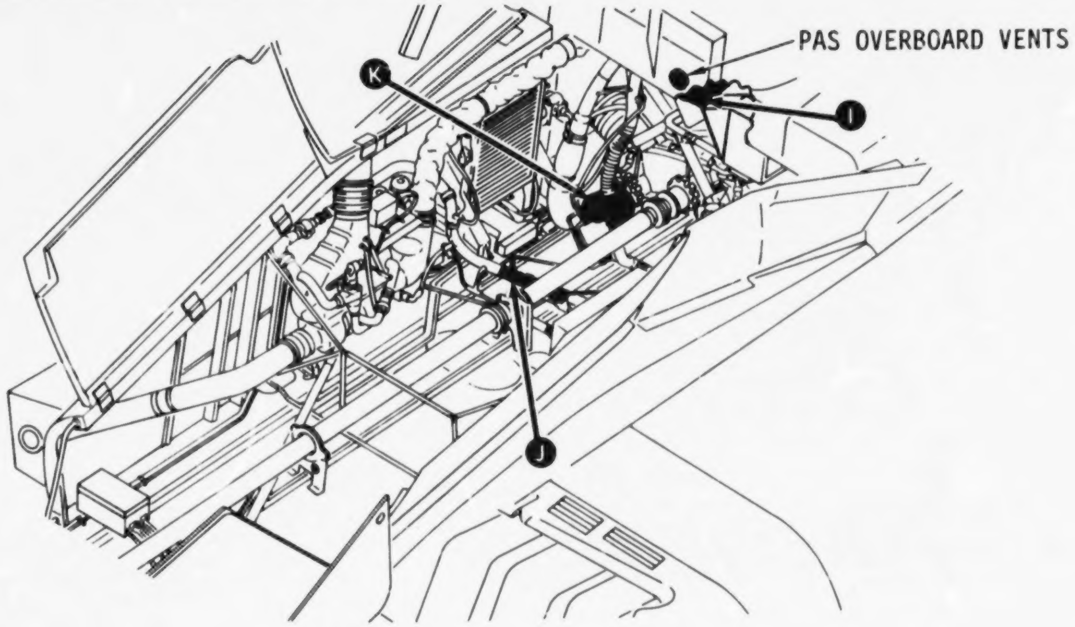
NOTES:

1. OPENS WITH NORMAL AIR PRESSURE FROM SDC
2. PERMITS INPUT AT C1 TO ENERGIZE K2-1/2 SOLENOID.
3. CLOSES CIRCUIT WITH APU START SWITCH AT START POSITION.
4. SOLENOID ENERGIZES WITH INPUT AT C1. SOLENOID DEENERGIZES 62 SECONDS AFTER INPUT AT C1. (ALLOWS APU TO REACH OPERATING SPEED BEFORE OPENING SDC THROTTLE VALVE.)
5. 28 VDC INPUT OPENS SDC THROTTLE VALVE.
6. SWITCH CLOSES AT 340-360 °F.

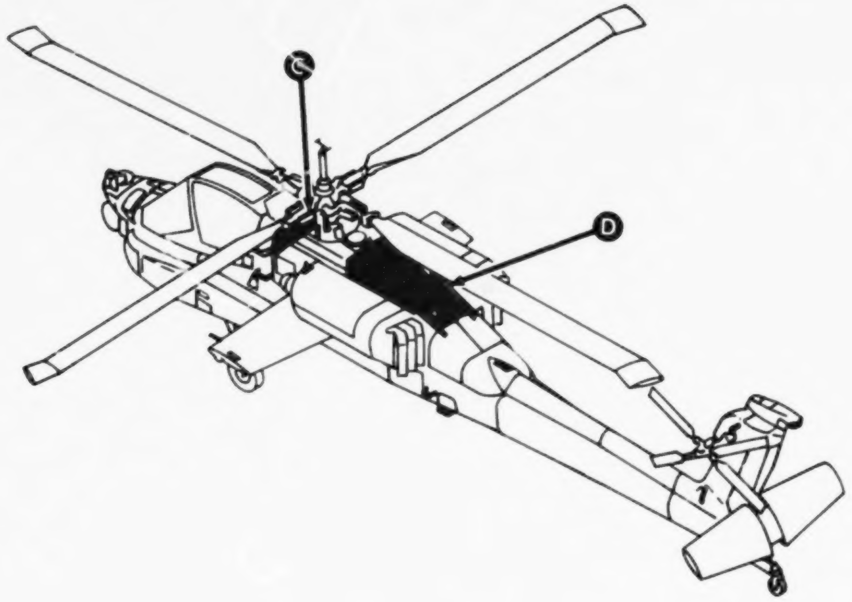
MM04/1-814G

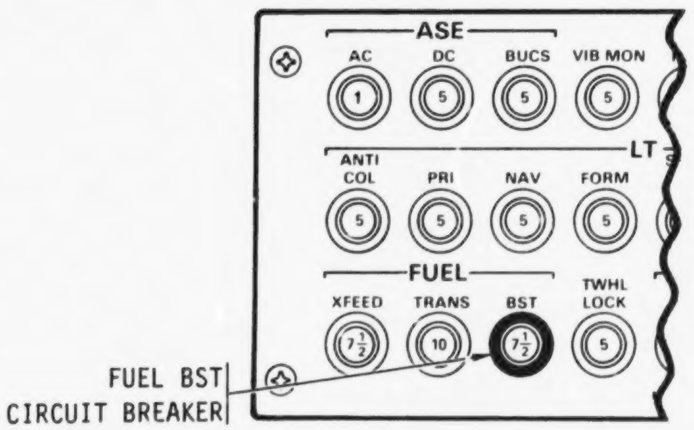
7-4-4. PRESSURIZED AIR SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION


PILOT STATION
A
B

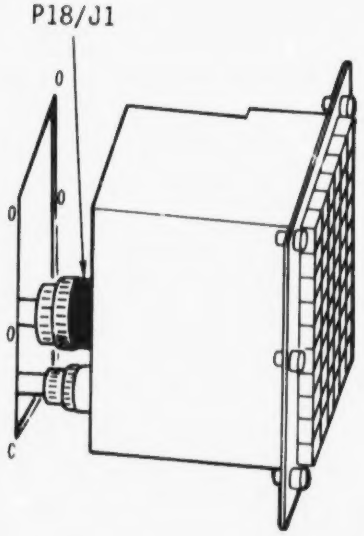

PAS OVERBOARD VENTS
K
I
J

D AFT DECK

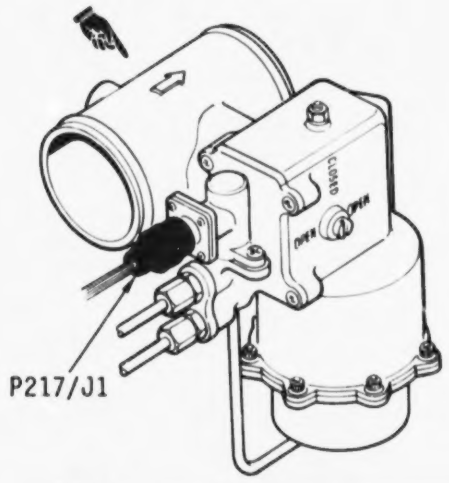



ASE
AC
DC
BUCS
VIB MON
1
5
5
5
LT
ANTI COL
PRI
NAV
FORM
5
5
5
5
FUEL
XFEED
TRANS
BST
TWHL LOCK
7½
10
7½
5
FUEL BST CIRCUIT BREAKER

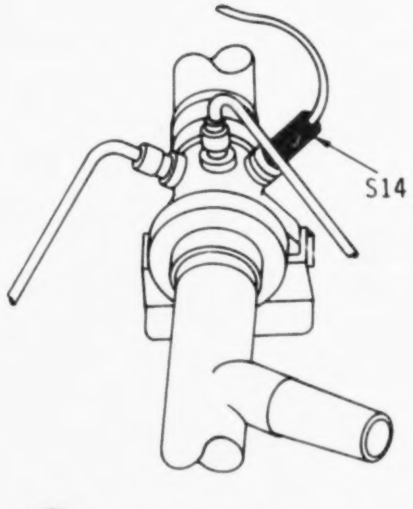
A P/O PILOT CENTER CIRCUIT BREAKER PANEL



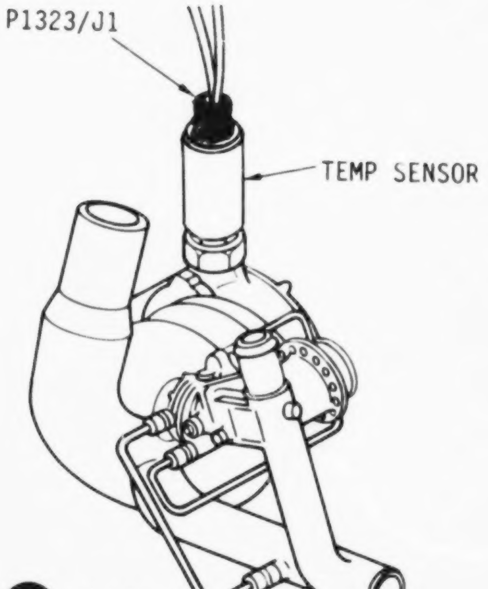
B PILOT CAUTION/WARNING PANEL


CLOSED
OPEN
OPEN
P217/J1

I SHAFT DRIVEN COMPRESSOR INLET THROTTLE VALVE



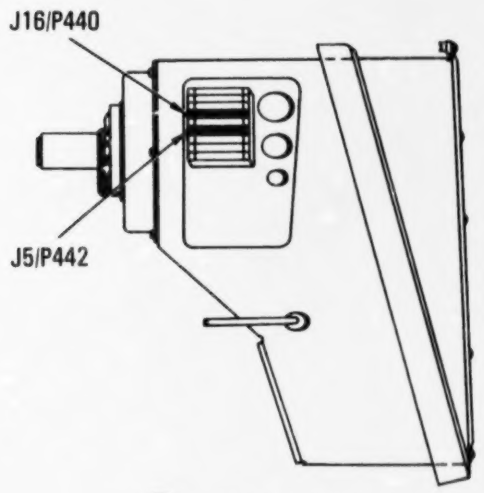
J SHAFT DRIVEN COMPRESSOR OUTLET PRESSURE SWITCH


P1323/J1
TEMP SENSOR

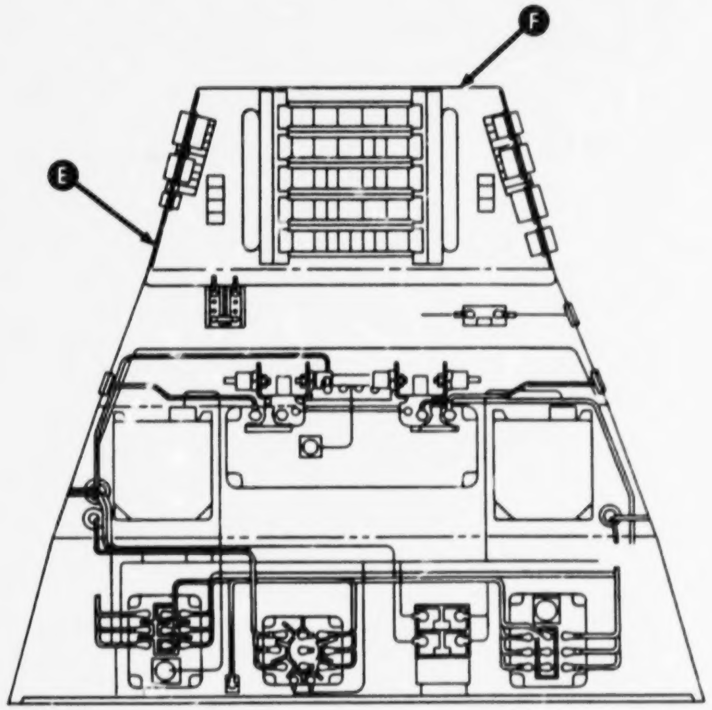
K SHAFT DRIVEN COMPRESSOR

MM04/1-813-1C

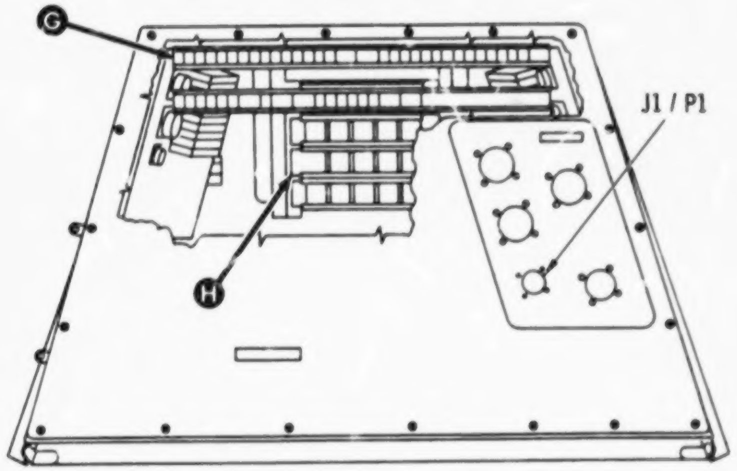
7-4-4. PRESSURIZED AIR SYSTEM - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


J16/P440
J5/P442

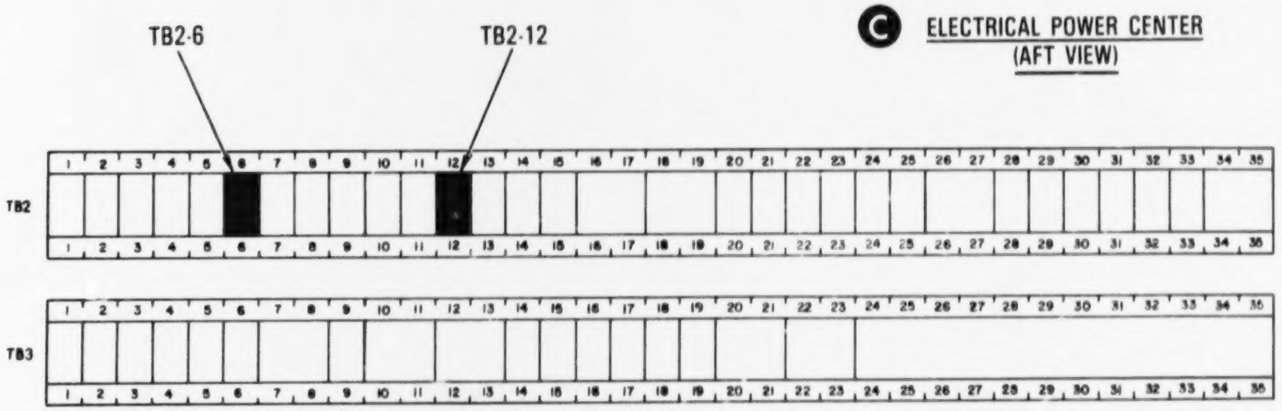
E RIGHT SIDE VIEW (ROTATED)



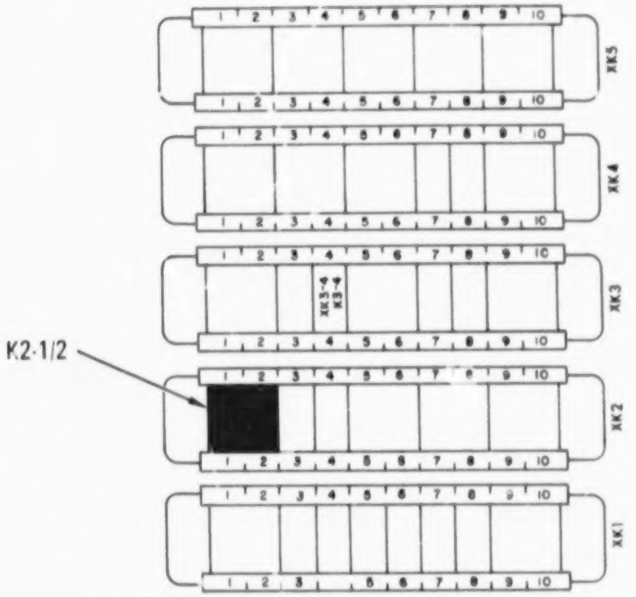
C ELECTRICAL POWER CENTER (AFT VIEW)



F DISTRIBUTION BOX (AFT VIEW)


TB2-6
TB2-12
TB2
TB3

G TERMINAL BOARDS (FORWARD VIEW)


K2-1/2
XK5
XK4
XK3
XK2
XK1

H RELAYS

MM04/1-813-2

7-4-5. SHAFT DRIVEN COMP INDICATOR - IS NOT LIGHTED DURING APU START CYCLE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/PSM-45	6625-01-139-2512

Personnel Required:

67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician
100KG	Pilot

References:

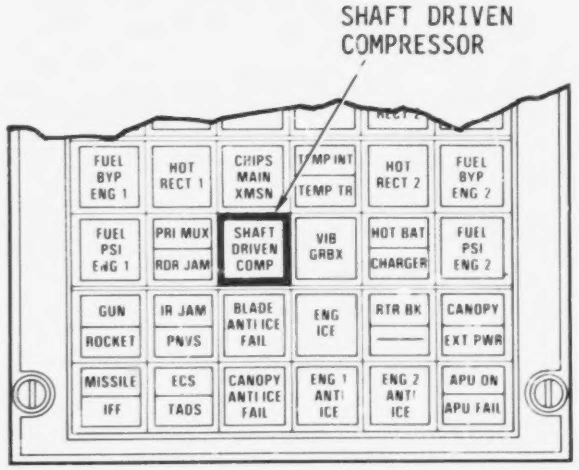
TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-CL	Engine No. 1 operating with rotor brake engaged
Para 1-3-2	ICS connected

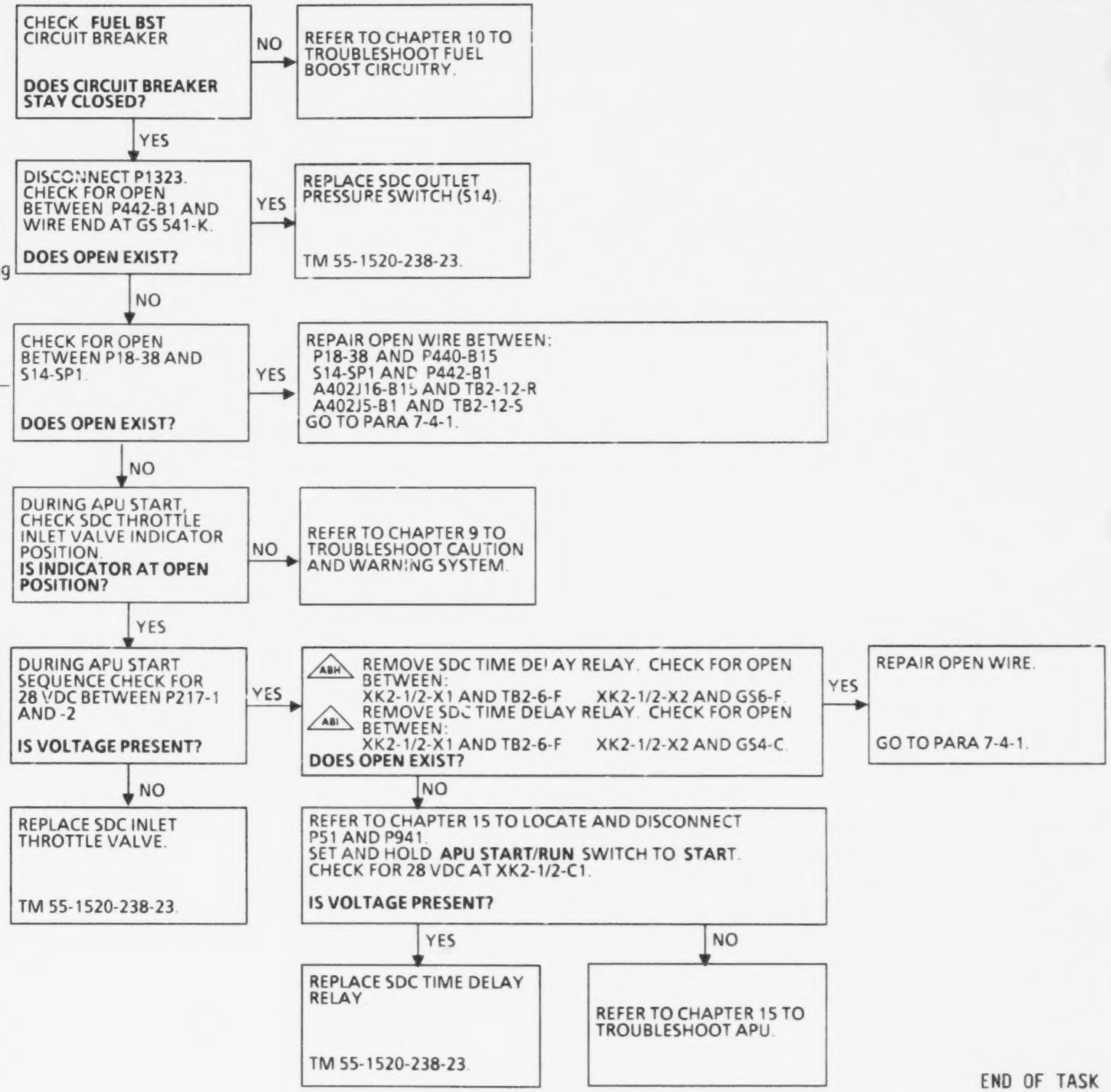
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


SHAFT DRIVEN COMPRESSOR
FUEL BYP ENG 1
HOT RECT 1
CHIPS MAIN XMSN
TEMP INT
TEMP TR
HOT RECT 2
FUEL BYP ENG 2
FUEL PSI ENG 1
PRI MUX
RDR JAM
SHAFT DRIVEN COMP
VIB GRBX
HOT BAT
CHARGER
FUEL PSI ENG 2
GUN
ROCKET
IR JAM
PNVS
BLADE ANTI ICE FAIL
ENG ICE
RTR BK
CANOPY
EXT PWR
MISSILE
IFF
ECS
TADS
CANOPY ANTI ICE FAIL
ENG 1 ANTI ICE
ENG 2 ANTI ICE
APU ON
APU FAIL

PILOT CAUTION/WARNING PANEL

MM04/1-705


NO
YES
YES
NO
YES
NO
NO
YES
YES
YES
NO
NO
YES
NO
ABH
ABI

CHECK **FUEL BST** CIRCUIT BREAKER

DOES CIRCUIT BREAKER STAY CLOSED?

REFER TO CHAPTER 10 TO TROUBLESHOOT FUEL BOOST CIRCUITRY.

DISCONNECT P1323. CHECK FOR OPEN BETWEEN P442-B1 AND WIRE END AT GS 541-K.

DOES OPEN EXIST?

REPLACE SDC OUTLET PRESSURE SWITCH (S14).

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN P18-38 AND S14-SP1.

DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN:
P18-38 AND P440-B15
S14-SP1 AND P442-B1
A402J16-B15 AND TB2-12-R
A402J5-B1 AND TB2-12-S
GO TO PARA 7-4-1.

DURING APU START, CHECK SDC THROTTLE INLET VALVE INDICATOR POSITION.

IS INDICATOR AT OPEN POSITION?

REFER TO CHAPTER 9 TO TROUBLESHOOT CAUTION AND WARNING SYSTEM.

DURING APU START SEQUENCE CHECK FOR 28 VDC BETWEEN P217-1 AND -2

IS VOLTAGE PRESENT?

REMOVE SDC TIME DELAY RELAY. CHECK FOR OPEN BETWEEN:
XK2-1/2-X1 AND TB2-6-F XK2-1/2-X2 AND GS6-F.
REMOVE SDC TIME DELAY RELAY. CHECK FOR OPEN BETWEEN:
XK2-1/2-X1 AND TB2-6-F XK2-1/2-X2 AND GS4-C.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 7-4-1.

REPLACE SDC INLET THROTTLE VALVE.

TM 55-1520-238-23.

REFER TO CHAPTER 15 TO LOCATE AND DISCONNECT P51 AND P941.
SET AND HOLD **APU START/RUN** SWITCH TO **START**.
CHECK FOR 28 VDC AT XK2-1/2-C1.

IS VOLTAGE PRESENT?

REPLACE SDC TIME DELAY RELAY.

TM 55-1520-238-23.

REFER TO CHAPTER 15 TO TROUBLESHOOT APU.

END OF TASK

7-4-6. SHAFT DRIVEN COMP INDICATOR - REMAINS LIGHTED AFTER APU START CYCLE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512
Thermometer, Digital Degrees Celcius	6625-01-085-1580

Personnel Required:

67R20 Attack Helicopter Repairer
68F10 Aircraft Electrician

References:

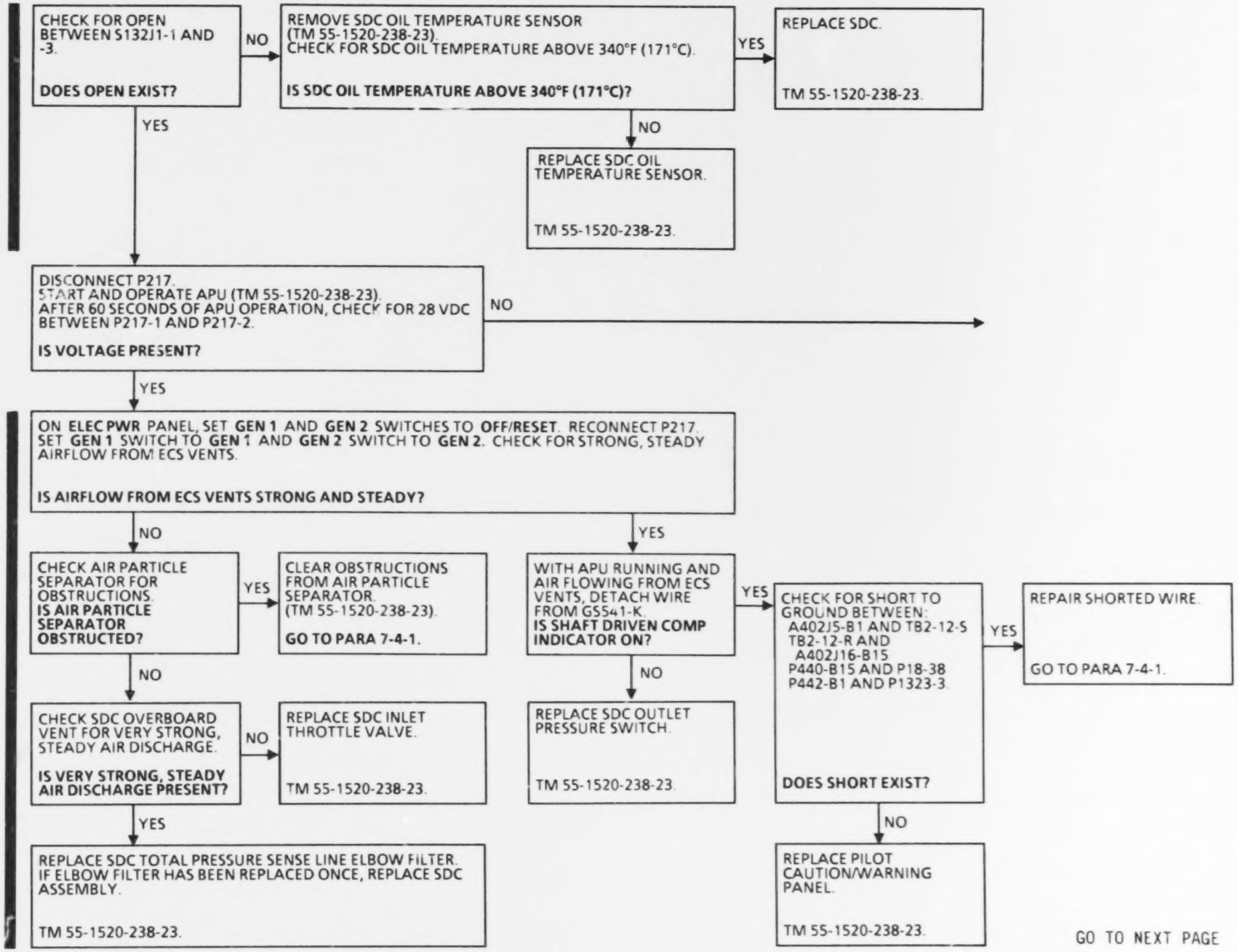
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - R200 panel removed
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR OPEN BETWEEN S132J1-1 AND -3.

DOES OPEN EXIST?

REMOVE SDC OIL TEMPERATURE SENSOR (TM 55-1520-238-23). CHECK FOR SDC OIL TEMPERATURE ABOVE 340°F (171°C).

IS SDC OIL TEMPERATURE ABOVE 340°F (171°C)?

REPLACE SDC.

TM 55-1520-238-23.

REPLACE SDC OIL TEMPERATURE SENSOR.

TM 55-1520-238-23.

DISCONNECT P217. START AND OPERATE APU (TM 55-1520-238-23). AFTER 60 SECONDS OF APU OPERATION, CHECK FOR 28 VDC BETWEEN P217-1 AND P217-2.

IS VOLTAGE PRESENT?

ON **ELEC PWR** PANEL, SET **GEN 1** AND **GEN 2** SWITCHES TO **OFF/RESET**. RECONNECT P217. SET **GEN 1** SWITCH TO **GEN 1** AND **GEN 2** SWITCH TO **GEN 2**. CHECK FOR STRONG, STEADY AIRFLOW FROM ECS VENTS.

IS AIRFLOW FROM ECS VENTS STRONG AND STEADY?

CHECK AIR PARTICLE SEPARATOR FOR OBSTRUCTIONS. **IS AIR PARTICLE SEPARATOR OBSTRUCTED?**

CLEAR OBSTRUCTIONS FROM AIR PARTICLE SEPARATOR. (TM 55-1520-238-23).

GO TO PARA 7-4-1.

WITH APU RUNNING AND AIR FLOWING FROM ECS VENTS, DETACH WIRE FROM GS541-K. **IS SHAFT DRIVEN COMP INDICATOR ON?**

CHECK FOR SHORT TO GROUND BETWEEN:
A402J5-B1 AND TB2-12-S
TB2-12-R AND A402J16-B15
P440-B15 AND P18-38
P442-B1 AND P1323-3.

DOES SHORT EXIST?

REPAIR SHORTED WIRE.

GO TO PARA 7-4-1.

CHECK SDC OVERBOARD VENT FOR VERY STRONG, STEADY AIR DISCHARGE.

IS VERY STRONG, STEADY AIR DISCHARGE PRESENT?

REPLACE SDC INLET THROTTLE VALVE.

TM 55-1520-238-23.

REPLACE SDC OUTLET PRESSURE SWITCH.

TM 55-1520-238-23.

REPLACE SDC TOTAL PRESSURE SENSE LINE ELBOW FILTER. IF ELBOW FILTER HAS BEEN REPLACED ONCE, REPLACE SDC ASSEMBLY.

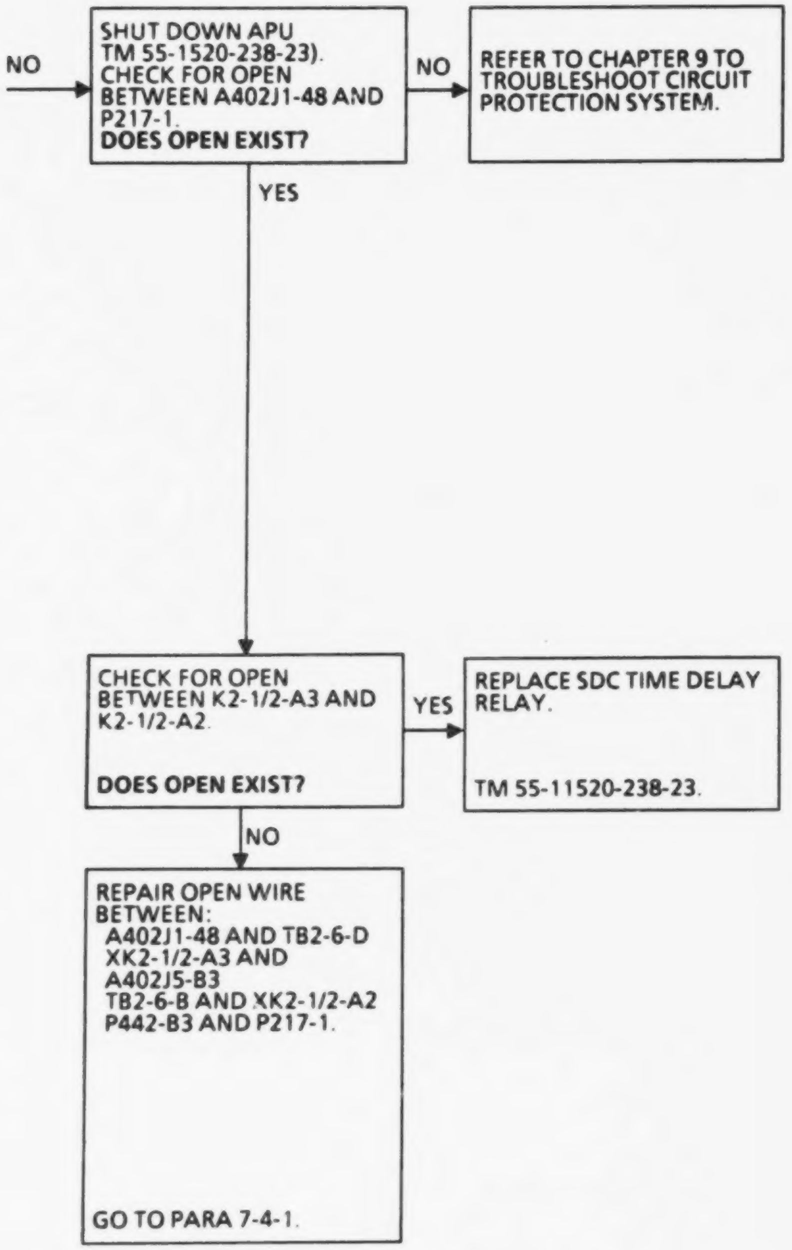
TM 55-1520-238-23.

REPLACE PILOT CAUTION/WARNING PANEL.

TM 55-1520-238-23.

GO TO NEXT PAGE

7-4-6. SHAFT DRIVEN COMP INDICATOR - REMAINS LIGHTED AFTER APU START CYCLE (cont)


NO
SHUT DOWN APU TM 55-1520-238-23). CHECK FOR OPEN BETWEEN A402J1-48 AND P217-1. DOES OPEN EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
YES
CHECK FOR OPEN BETWEEN K2-1/2-A3 AND K2-1/2-A2. DOES OPEN EXIST?
YES
REPLACE SDC TIME DELAY RELAY. TM 55-11520-238-23.
NO
REPAIR OPEN WIRE BETWEEN: A402J1-48 AND TB2-6-D XK2-1/2-A3 AND A402J5-B3 TB2-6-B AND XK2-1/2-A2 P442-B3 AND P217-1. GO TO PARA 7-4-1.

7-4-7. ECS AIRFLOW DOES NOT DECREASE - WITH FUEL BST CIRCUIT BREAKER OPEN AND NO. 1 ENGINE OPERATING

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

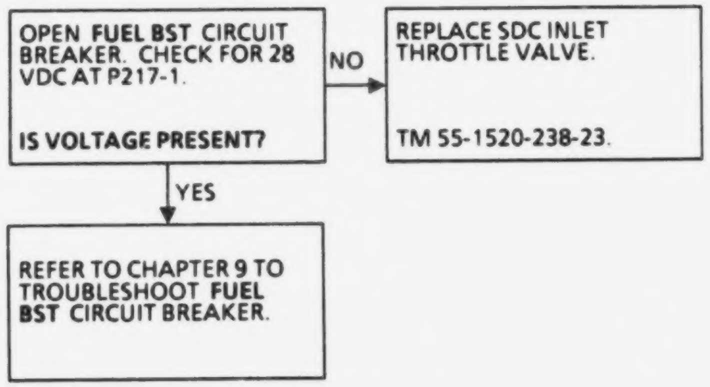
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Access provisions - R200 panel removed

WARNING

Turn off power before disconnecting or reconecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


OPEN FUEL BST CIRCUIT BREAKER. CHECK FOR 28 VDC AT P217-1. IS VOLTAGE PRESENT?
NO
REPLACE SDC INLET THROTTLE VALVE. TM 55-1520-238-23.
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT FUEL BST CIRCUIT BREAKER.

END OF TASK

7-4-8. FUEL DOES NOT TRANSFER - WITH NO. 1 ENGINE BLEED AIR SUPPLYING PAS MANIFOLD

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692

Personnel Required:

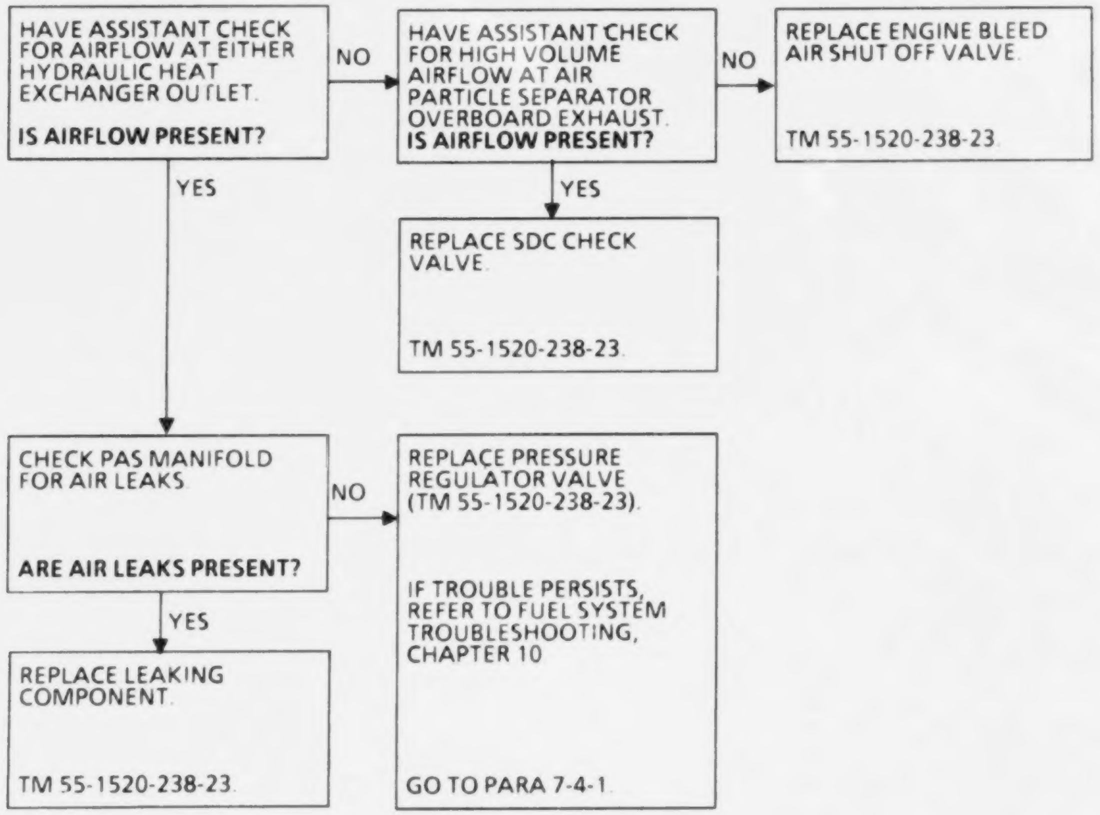
67R10 Attack Helicopter Repairer
100KG Pilot

References:

TM 55-1520-238-CL
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-CL	No. 1 engine operating
TM 55-1520-238-23	Helicopter safed
	Access provisions - L325 door opened
Para 1-3-2	ICS connected


HAVE ASSISTANT CHECK FOR AIRFLOW AT EITHER HYDRAULIC HEAT EXCHANGER OUTLET.
IS AIRFLOW PRESENT?
NO
HAVE ASSISTANT CHECK FOR HIGH VOLUME AIRFLOW AT AIR PARTICLE SEPARATOR OVERBOARD EXHAUST.
IS AIRFLOW PRESENT?
NO
REPLACE ENGINE BLEED AIR SHUT OFF VALVE.
TM 55-1520-238-23.
YES
REPLACE SDC CHECK VALVE.
TM 55-1520-238-23.
YES
CHECK PAS MANIFOLD FOR AIR LEAKS.
ARE AIR LEAKS PRESENT?
NO
REPLACE PRESSURE REGULATOR VALVE (TM 55-1520-238-23).
IF TROUBLE PERSISTS, REFER TO FUEL SYSTEM TROUBLESHOOTING, CHAPTER 10.
GO TO PARA 7-4-1.
YES
REPLACE LEAKING COMPONENT.
TM 55-1520-238-23.

END OF TASK

7-4-9. FUEL BST CIRCUIT BREAKER - DOES NOT STAY CLOSED

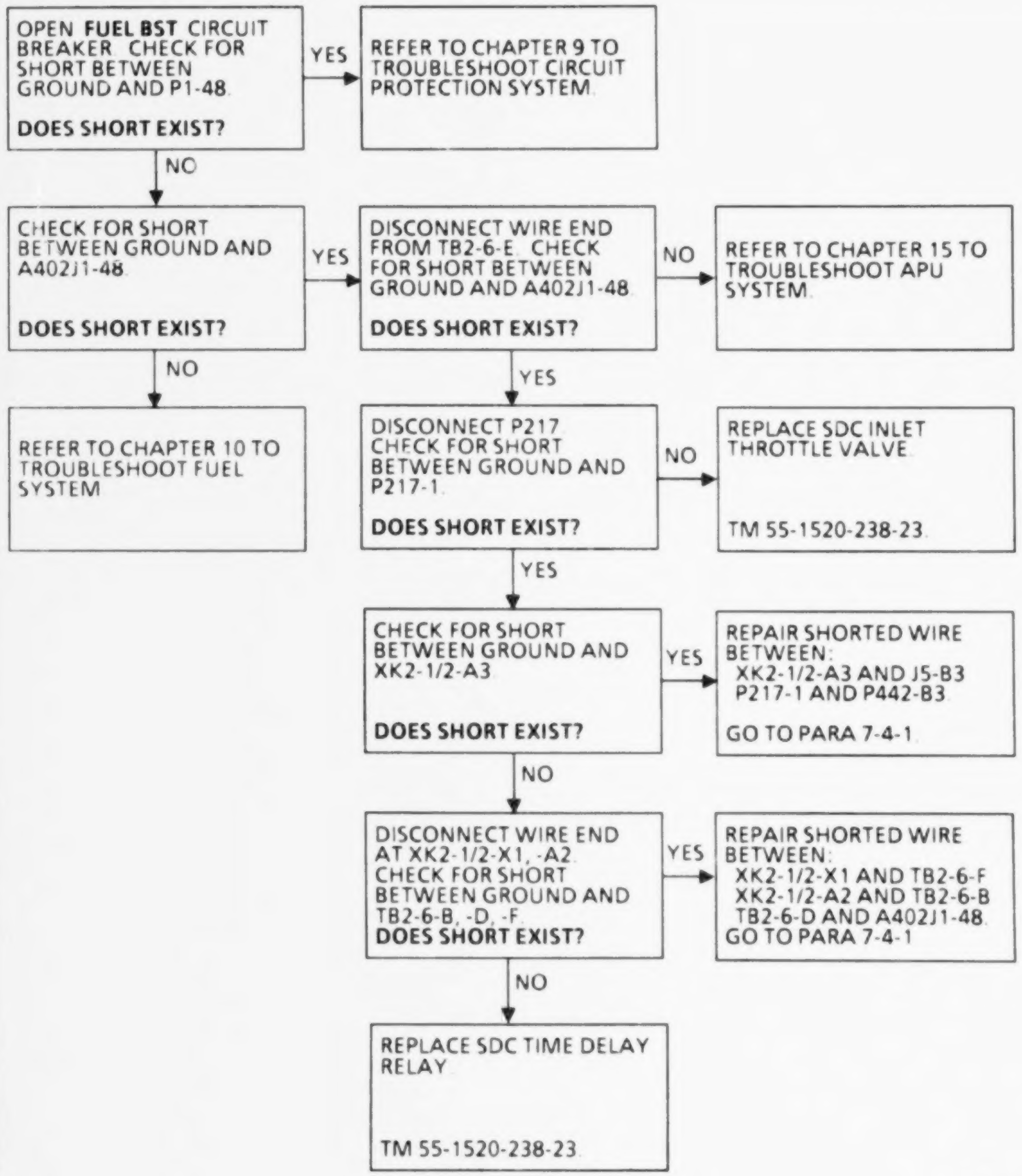
Tools: (para 7-4-7)

Personnel Required: (para 7-4-7)

References: (para 7-4-7)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


OPEN FUEL BST CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND P1-48.
DOES SHORT EXIST?
YES
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
NO
CHECK FOR SHORT BETWEEN GROUND AND A402J1-48.
DOES SHORT EXIST?
YES
DISCONNECT WIRE END FROM TB2-6-E. CHECK FOR SHORT BETWEEN GROUND AND A402J1-48.
DOES SHORT EXIST?
NO
REFER TO CHAPTER 15 TO TROUBLESHOOT APU SYSTEM.
NO
REFER TO CHAPTER 10 TO TROUBLESHOOT FUEL SYSTEM.
YES
DISCONNECT P217. CHECK FOR SHORT BETWEEN GROUND AND P217-1.
DOES SHORT EXIST?
NO
REPLACE SDC INLET THROTTLE VALVE.
TM 55-1520-238-23.
YES
CHECK FOR SHORT BETWEEN GROUND AND XK2-1/2-A3.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN:
XK2-1/2-A3 AND J5-B3
P217-1 AND P442-B3.
GO TO PARA 7-4-1.
NO
DISCONNECT WIRE END AT XK2-1/2-X1, -A2. CHECK FOR SHORT BETWEEN GROUND AND TB2-6-B, -D, -F.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN:
XK2-1/2-X1 AND TB2-6-F
XK2-1/2-A2 AND TB2-6-B
TB2-6-D AND A402J1-48.
GO TO PARA 7-4-1.
NO
REPLACE SDC TIME DELAY RELAY.
TM 55-1520-238-23.

END OF TASK

CHAPTER 8. INSTRUMENTS

CHAPTER OVERVIEW

Chapter 8 contains the operational checks and fault isolation procedures required for troubleshooting the instruments.

Instrument maintenance information is in TM 55-1520-238-23.

Chapter 8 is divided into the following sections:

Section	Para	Title
I	8-1-1	Failure Symptom List
II	8-2-1	Engine Instruments - Operational Check
III	8-3-1	Flight Instruments - Operational Check
IV	8-4-1	Miscellaneous Instruments - Operational Check

8-1-1. INSTRUMENTS - FAILURE SYMPTOM LIST

Symptom	Go to Para
A. Engine Instruments - Operational Check:	
1. Pilot **ENG INST** circuit breaker - does not stay closed.	8-2-1
2. Deleted	
3. **AUX PWR** indicator on dim/test panel - lights.	8-2-1
4. **AUX PWR** indicator on dim/test panel - does not light.	8-2-1
5. CPG **EMERG BATT ENG INST** circuit breaker - does not stay closed (helicopters with CPG dim/test panel installed).	8-2-1
6. All pilot engine instruments - do not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted.	8-2-1
7. Pilot **TGT** indicator - does not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted.	8-2-1
8. Pilot **TORQUE** indicator - does not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted.	8-2-1
9. Pilot **FUEL LBX10** indicator - does not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted.	8-2-1
10. Pilot **N_G** indicator - does not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted.	8-2-1
11. Pilot **ENG-RTR** indicator - does not indicate full scale or vertical display scales have every other lamp not lighted.	8-2-1
12. Pilot **ENG OIL** indicator - does not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted.	8-2-1
13. Pilot **TGT**, **TORQUE**, **FUEL LBX10**, and **N_G** indicator digital readouts - are not blanked out.	8-2-1
14. Pilot **TGT** indicator digital readouts - are not blanked out.	8-2-1
15. Pilot **TORQUE** indicator digital readouts - are not blanked out.	8-2-1

	Symptom	Go to Para
16.	Pilot **FUEL LBX10** indicator digital readouts - are not blanked out.	8-2-1
17.	Pilot **N_G** indicator digital readouts - are not blanked out.	8-2-1
18.	Pilot **TGT**, **TORQUE**, **FUEL LBX10**, and **N_G** indicator digital readouts - are blanked out.	8-2-1
19.	Pilot **ENG OIL**, **TGT**, **TORQUE**, **FUEL LBX10** **ENG-RTR**, and **N_G** indicator vertical display lamps - do not dim (auto dim).	8-2-1
20.	Pilot **ENG OIL**, **TGT**, **TORQUE**, **FUEL LBX10**, **ENG-RTR**, and **N_G** indicator vertical display lamps do not dim (manual dim).	8-2-1
21.	Pilot **TGT**, indicator vertical display scales or digital readouts - do not indicate ambient temperature ±5 degrees.	8-2-1
22.	Pilot **TORQUE** indicator vertical display scales or digital readouts - do not indicate between zero and two percent.	8-2-1
23.	Pilot **N_G** indicator vertical display scales or digital readouts - do not indicate between zero and five percent.	8-2-1
24.	Pilot **FUEL LBX10** indicator vertical display scales or digital readouts - do not indicate existing fuel ±20 pounds.	8-2-1
25.	Pilot **ENG OIL** indicator vertical display scales - do not indicate zero pressure.	8-2-1
26.	Pilot **ENG-RTR** indicator vertical display scales - do not indicate zero percent.	8-2-1
27.	Deleted.	
28.	Deleted.	
29.	Deleted.	
30.	Deleted.	
31.	All CPG digital readouts remain lighted - CPG **DGT OFF/NORM/TST** switch set at **DGT OFF**.	8-2-1
32.	CPG **TORQUE** indicator digital readouts do not blank.	8-2-1

8-1-1. INSTRUMENTS - FAILURE SYMPTOM LIST (cont)

Symptom	Go to Para
A. Engine Instruments - Operational Check (cont):	
33. CPG SDD digital readouts do not blank (CPG dim/test panel installed).	8-2-1
34. CPG engine instruments vertical displays and digital readouts - brightness does not change when manual **DIM** control is rotated (with CPG dim/test panel installed).	8-2-1
35. CPG **TORQUE** indicator - does not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted (helicopters with CPG dim/test panel installed).	8-2-1
36. CPG **ENG-RTR** indicator does not indicate full scale or vertical display scales have every other lamp not lighted (helicopters with CPG dim/test panel installed).	8-2-1
37. CPG SDD indicator - does not indicate full scale or show all digital **8**s or vertical display scales have every other lamp not lighted (helicopters with CPG dim/test panel installed).	8-2-1
38. All CPG engine instrument vertical and digital displays are blank (with CPG dim/test panel installed).	8-2-1
39. All CPG engine instruments blank with **DGT OFF/NORM/TST** switch in **NORM** (helicopters with CPG dim/test panel installed).	8-2-1
40. CPG SDD panel engine instrument indicators - are not blanked.	8-2-1
41. CPG **TORQUE** indicator digital readouts - are not blanked out.	8-2-1
42. CPG SDD panel **TGT** digital readouts - do not indicate ambient temperature ±5 degrees.	8-2-1
43. CPG SDD panel N_G digital readouts - do not indicate zero to one-half percent.	8-2-1
44. CPG SDD panel **FUEL QTY LBX10** digital readouts - do not indicate existing fuel ±20 pounds.	8-2-1
45. CPG SDD panel **ENG OIL** digital readouts - do not indicate zero to five pounds pressure.	8-2-1
46. CPG **TORQUE** indicator vertical display scales and digital readouts - do not indicate zero to two percent.	8-2-1
47. CPG **ENG-RTR** indicator vertical display scales - do not indicate zero percent.	8-2-1
48. CPG SDD panel edge-lighting - does not light.	8-2-1

Symptom	Go to Para
49. CPG **TORQUE** indicator edge-lighting - does not light.	8-2-1
50. CPG **ENG-RTR** indicator edge-lighting - does not light.	8-2-1
51. CPG dim/test panel edge-lighting - does not light.	8-2-1
52. Pilot dim/test panel edge-lighting - does not light.	8-2-1
53. Pilot **TGT** indicator edge-lighting - does not light.	8-2-1
54. Pilot **TORQUE** indicator edge-lighting - does not light.	8-2-1
55. Pilot **FUEL LBX10** indicator edge-lighting - does not light.	8-2-1
56. Pilot N_G indicator edge-lighting - does not light.	8-2-1
57. Pilot **ENG-RTR** indicator edge-lighting - does not light.	8-2-1
58. Pilot **ENG OIL** indicator edge-lighting - does not light.	8-2-1
59. Pilot and CPG **ENG-OIL** indicator - does not indicate engine 1 oil pressure.	8-2-1
60. Pilot and CPG **ENG OIL** indicator - does not indicate engine 2 oil pressure.	8-2-1
61. Pilot and CPG **TORQUE** indicators - do not indicate engine 1 torque.	8-2-1
62. CPG SDD - does not indicate **ENG 1** and/or **ENG 2** oil pressure.	8-2-1
63. Pilot **TORQUE** indicator - does not indicate engine 1 torque.	8-2-1
64. CPG **TORQUE** indicator - does not indicate engine 1 torque.	8-2-1
65. Pilot and CPG **TORQUE** indicators - do not indicate engine 2 torque.	8-2-1
66. Pilot **TORQUE** indicator - does not indicate engine 2 torque.	8-2-1
67. CPG **TORQUE** indicator - does not indicate engine 2 torque.	8-2-1
68. Engine torque display on pilot VDU - flashes, or is not present.	8-2-1
69. Pilot and CPG **ENG-RTR** indicators - do not indicate engine 1 N_p	8-2-1
70. Pilot and CPG **ENG-RTR** indicators - do not indicate engine 2 N_p	8-2-1
71. Pilot **ENG-RTR** indicator - does not indicate engine 1 N_p	8-2-1
72. CPG **ENG-RTR** indicator - does not indicate engine 1 N_p	8-2-1

8-1-1. INSTRUMENTS - FAILURE SYMPTOM LIST (cont)

Symptom	Go to Para
A. Engine Instruments - Operational Check (cont):	
73. Pilot **ENG-RTR** indicator - does not indicate engine 2 N_p.	8-2-1
74. CPG **ENG-RTR** indicator - does not indicate engine 2 N_p.	8-2-1
75. Pilot and CPG **ENG-RTR** indicators - do not indicate N_r.	8-2-1
76. Pilot **ENG-RTR** indicator - does not indicate N_r.	8-2-1
77. CPG **ENG-RTR** indicator - does not indicate N_r.	8-2-1
78. Pilot N_G indicator - does not indicate engine 1 N_G.	8-2-1
79. Pilot N_G indicator - does not indicate engine 2 N_G.	8-2-1
80. CPG selectable digital display panel - does not indicate engine 1 and/or engine 2 N_G.	8-2-1
81. Pilot **TGT** indicator - does not indicate engine 1 TGT.	8-2-1
82. Pilot **TGT** indicator - does not indicate engine 2 TGT.	8-2-1
83. CPG selectable digital display panel - does not indicate engine 1 and/or engine 2 TGT.	8-2-1

Symptom	Go to Para
B. Flight Instruments - Operational Check:	
1. CPG airspeed indicator edge-lighting - does not come on.	8-3-1
2. CPG **VERTICAL SPEED** indicator edge-lighting - does not light.	8-3-1
3. CPG barometric altimeter edge-lighting - does not light.	8-3-1
4. Pilot airspeed indicator edge-lighting - does not light.	8-3-1
5. Pilot accelerometer indicator edge-lighting - does not light.	8-3-1
6. Pilot barometric altimeter edge-lighting - does not light.	8-3-1
7. Pilot **VERTICAL SPEED** indicator edge-lighting - does not light.	8-3-1
8. Pilot barometric altimeter - internal vibrator is not heard.	8-3-1
9. CPG barometric altimeter - internal vibrator is not heard.	8-3-1
10. Magnetic compass lamp - does not light.	8-3-1
11. Pilot standby attitude indicator edge-lighting - does not light.	8-3-1

Symptom	Go to Para
12. Pilot standby attitude indicator OFF flag - is visible with electrical power on and indicator uncaged.	8-3-1
C. Miscellaneous Instruments - Operational Check:	
1. Pilot clock edge-lighting - does not light.	8-4-1
2. CPG clock edge-lighting - does not light.	8-4-1

8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692

Personnel Required:

100KG	Pilot
67R10	Attack Helicopter Repairer
	One person to assist

References:

TM 55-1520-238-CL
TM 55-1520-238-23
TM 55-1520-238-PMS

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
Para 1-3-2	ICS connected

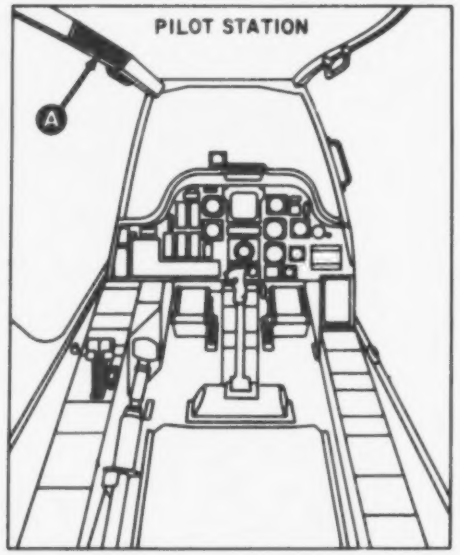
A. Perform visual inspection of power plants and engine instruments (TM 55-1520-238-PMS).

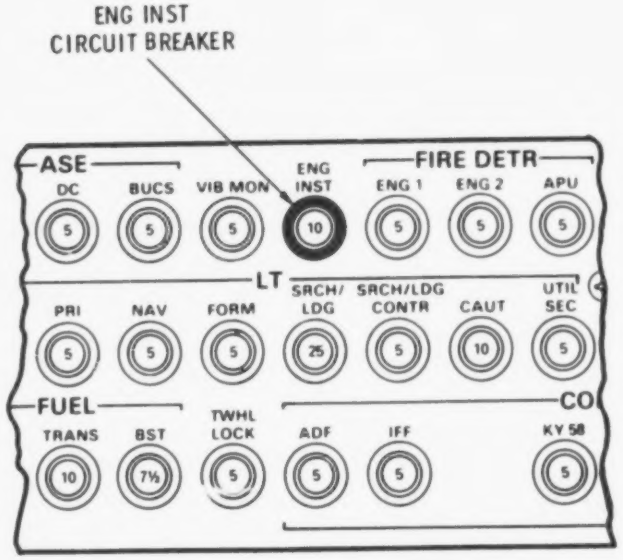
B. Complete the operational check as follows:

NOTE

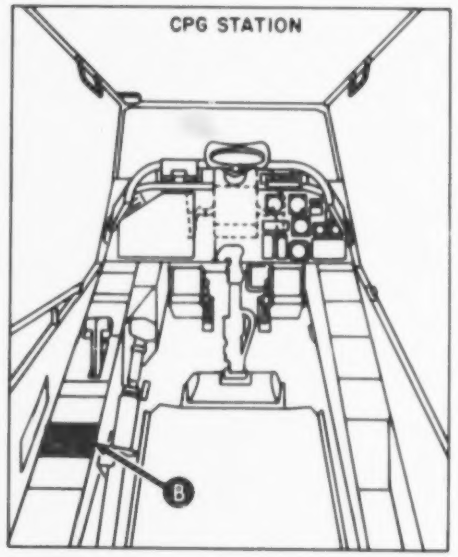
- Troubleshooting procedures isolating the vertical scale and digital readout of engine one or two are the same. Follow instructions pertaining only to applicable display for engine one or two, where indicated.
- **DGT OFF/NORM/TST** switch located on the dim/test panel is a momentary switch. When **DGT OFF/NORM/TST** switch is placed in **TST** position, all engine instruments vertical display lamps and green indicators light for three seconds and all the digital readouts remain lighted as long as the switch is held in **TST** position.

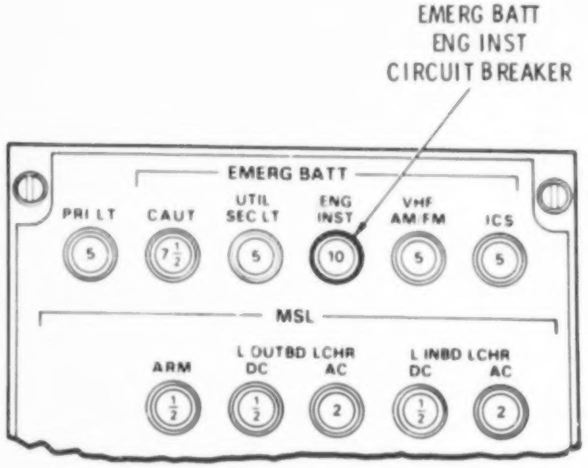
TASK	RESULT
1. Check the **ENG INST** circuit breaker on pilot center circuit breaker panel, is closed.	If pilot **ENG INST** circuit breaker does not stay closed, go to para 8-2-6.


PILOT STATION
A


ENG INST
CIRCUIT BREAKER
ASE
DC
BUCS
VIB MON
ENG INST
FIRE DETR
ENG 1
ENG 2
APU
5
5
5
10
5
5
5
LT
PRI
NAV
FORM
SRCH/ LDG
SRCH/LDG CONTR
CAUT
UTIL SEC
5
5
5
25
5
10
5
FUEL
TRANS
BST
TWHL LOCK
ADF
IFF
CO
KY 58
10
7½
5
5
5
5

Ⓐ PILOT CENTER CIRCUIT BREAKER PANEL


CPG STATION
B


EMERG BATT
ENG INST
CIRCUIT BREAKER
EMERG BATT
PRI LT
CAUT
UTIL SEC LT
ENG INST
VHF AM/FM
ICS
5
7½
5
10
5
5
MSL
ARM
L OUTBD LCHR DC
AC
L INBD LCHR DC
AC
½
½
2
½
2

Ⓑ CPG CIRCUIT BREAKER PANEL NO. 1

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GO TO NEXT PAGE

8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

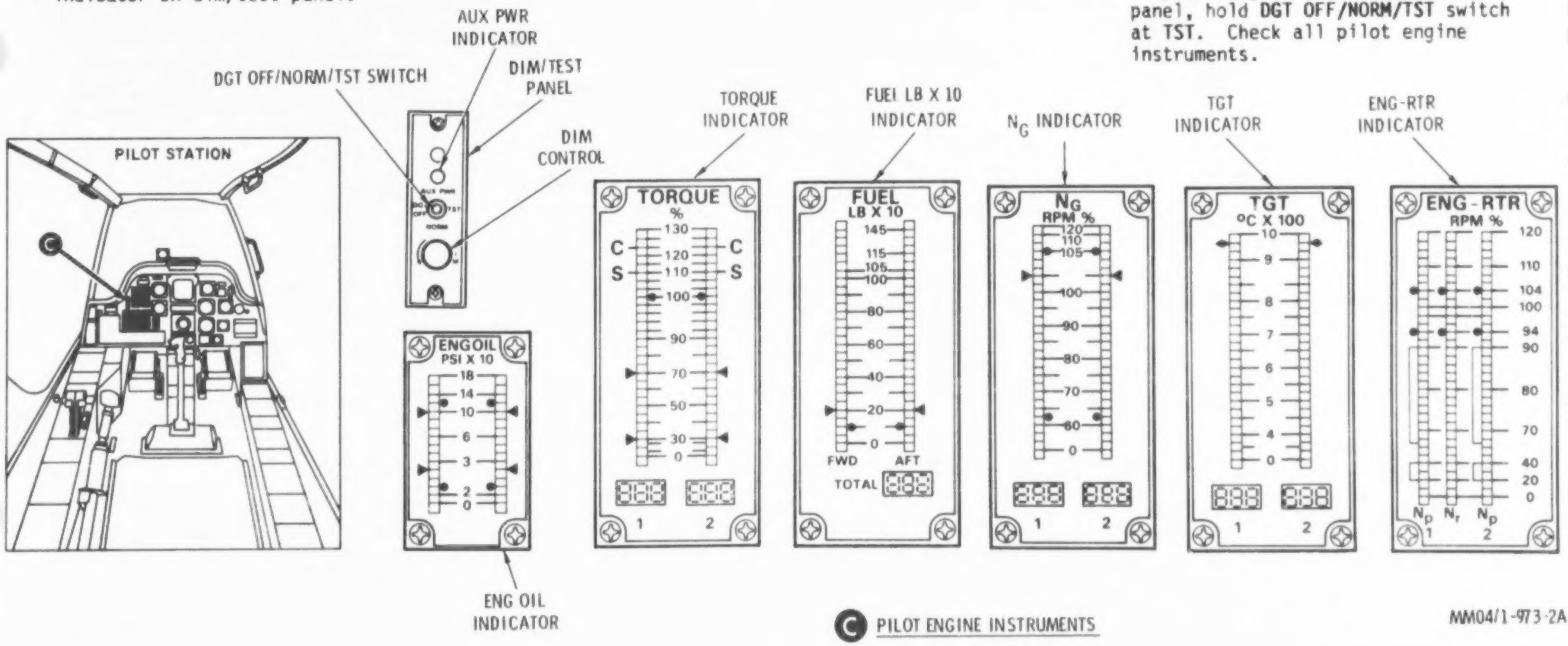
TASK	RESULT
2. Check that **EMERG BATT ENG INST** circuit breaker on CPG circuit breaker panel No. 1, is closed.	If CPG **EMERG BATT ENG INST** circuit breaker does not stay closed, go to para 8-2-10.

NOTE

Three-position **DGT OFF/NORM/TST** switch is spring loaded to return to **NORM**. When the switch is set at **TST**, all engine instrument vertical display lamps light for three seconds; all engine instrument digital readouts remain lighted while the switch is held at **TST**.

TASK	RESULT
3. On pilot engine instrument dim/test panel, set **DGT OFF/NORM/TST** switch to **NORM** and manual **DIM** control to midposition. Check **AUX PWR** indicator on dim/test panel.	If **AUX PWR** indicator lights, go to para 8-2-8.

TASK	RESULT
4. On pilot engine instrument dim/test panel, hold **DGT OFF/NORM/TST** switch at **TST**. Check **AUX PWR** indicator on dim/test panel.	If **AUX PWR** indicator does not light, go to para 8-2-9.
5. On pilot engine instrument dim/test panel, momentarily set the **DGT OFF/NORM/TST** switch to **TST**. Check all pilot engine instrument digital readouts and vertical display lamps.	If any single pilot engine instrument vertical display lamp does not light for three seconds, replace the applicable indicator (TM 55-1520-238-23). If all pilot engine instruments do not indicate full scale or digital **8**s go to para 8-2-11. If all pilot engine instruments have every other vertical display lamp not lighted, go to para 8-2-11.
6. On pilot engine instrument dim/test panel, hold **DGT OFF/NORM/TST** switch at **TST**. Check all pilot engine instruments.	If pilot **TGT** indicator does not indicate full scale or show all digital **8**s, go to para 8-2-12. If pilot **TGT** indicator does not show digital readouts, go to para 8-2-12. If pilot **TGT** indicator vertical display scales have every other lamp not lighted, go to para 8-2-12. If pilot **TORQUE** indicator does not indicate full scale or show all digital **8**s, go to para 8-2-13. If pilot **TORQUE** indicator does not show digital readouts, go to para 8-2-13. If pilot **TORQUE** indicator vertical display scales have every other lamp not lighted, go to para 8-2-13.


AUX PWR INDICATOR
DGT OFF/NORM/TST SWITCH
DIM/TEST PANEL
DIM CONTROL
TORQUE INDICATOR
FUEL LB X 10 INDICATOR
N_G INDICATOR
TGT INDICATOR
ENG-RTR INDICATOR
PILOT STATION
C
ENGOIL PSI X 10
18 14 10 6 3 2 0
TORQUE %
130 120 110 100 90 70 50 30 0
C S C S
1 2
FUEL LB X 10
145 115 105 100 80 60 40 20 0
FWD AFT
TOTAL
N_G RPM %
120 110 105 100 90 80 70 60 0
1 2
TGT °C X 100
10 9 8 7 6 5 4 0
1 2
ENG-RTR RPM %
120 110 104 100 94 90 80 70 40 20 0
N_p 1 N_r N_p 2
ENG OIL INDICATOR

C PILOT ENGINE INSTRUMENTS

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8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

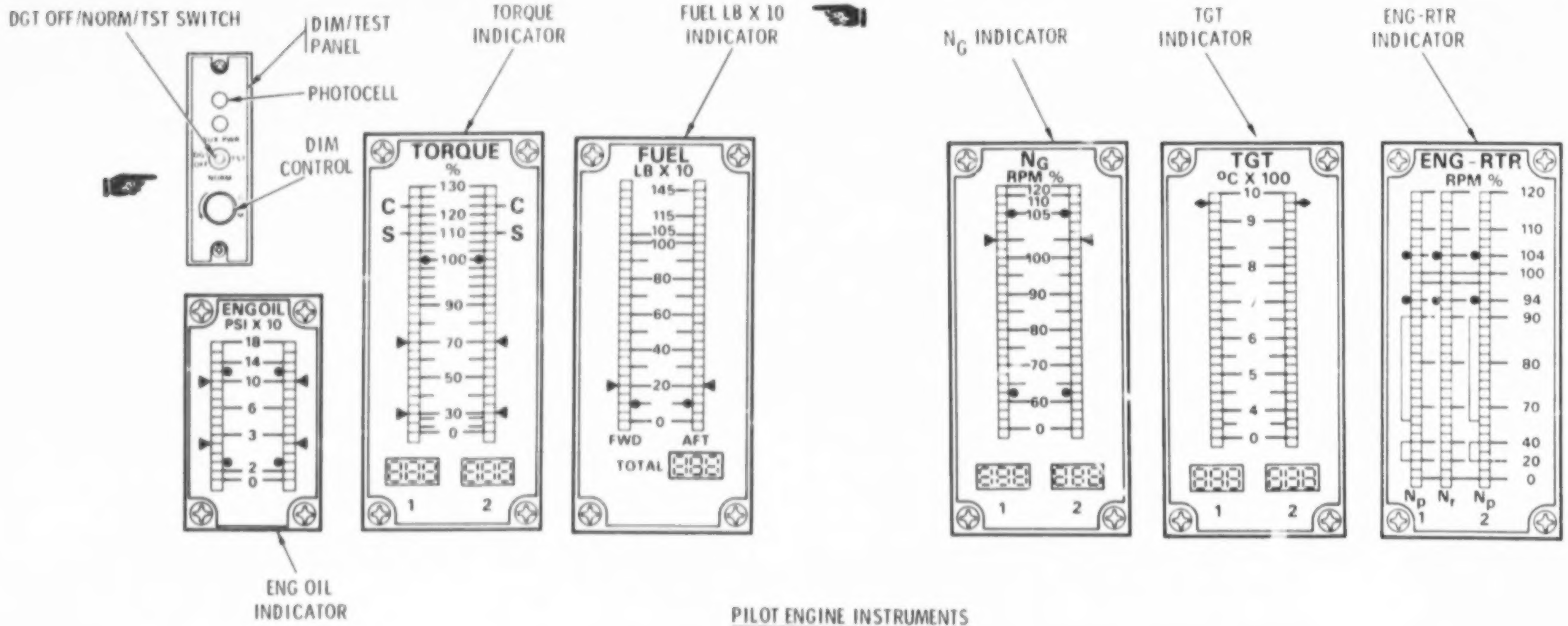
TASK	RESULT
	If pilot **FUEL LBX10** indicator does not indicate full scale or show all digital **8**s, go to para 8-2-14.
	If pilot **FUEL LBX10** indicator does not show digital readouts, go to para 8-2-14.
	If pilot **FUEL LBX10** indicator vertical display scales have every other lamp not lighted, go to para 8-2-14.
	If pilot N_G indicator does not indicate full scale or show all digital **8**s, go to para 8-2-15.
	If pilot N_G indicator does not show digital readouts, go to para 8-2-15.
	If pilot N_G indicator vertical display scales have every other lamp not lighted, go to para 8-2-15.
	If pilot **ENG-RTR** indicator vertical display scales have every other lamp not lighted, go to para 8-2-16.
	If pilot **ENG-RTR** indicator does not indicate full scale, go to para 8-2-16.
	If pilot **ENG OIL** pressure indicator vertical display scales have every other lamp not lighted, go to para 8-2-17.
	If pilot **ENG OIL** pressure indicator does not indicate full scale, go to para 8-2-17.
7. Set **DGT OFF/NORM/TST** switch at **DGT OFF**. Check **TGT**, **TORQUE**, **FUEL**, and N_G indicator digital readouts.	If pilot **TGT**, **TORQUE**, **FUEL LBX10**, and N_G indicator digital readouts are not blanked out, go to para 8-2-18.
	If pilot **TGT** indicator digital readouts are not blanked out, go to para 8-2-19.
	If pilot **TORQUE** indicator digital readouts are not blanked out, go to para 8-2-20.

TASK	RESULT
	If pilot **FUEL LBX10** indicator digital readouts are not blanked out, go to para 8-2-22.
	If pilot **N_G** indicator digital readouts are not blanked out, go to para 8-2-22.
8. On pilot engine instrument dim/test panel, set **DGT OFF/NORM/TST** switch at **NORM** and rotate **DIM** control to midposition.	If pilot **TGT**, **TORQUE**, **FUEL LBX10**, and **N_G** indicator digital readouts are blanked out, go to para 8-2-23.
9. Cover photocell on dim/test panel.	If pilot **ENG OIL**, **TGT**, **TORQUE**, **FUEL LBX10**, **ENG-RTR**, and **N_G** indicator vertical display lamps do not dim, go to para 8-2-24.
10. Shine light directly into photocell located on dim/test panel.	If pilot **ENG OIL**, **TGT**, **TORQUE**, **FUEL LBX10**, **ENG-RTR**, and **N_G** indicator vertical display lamps do not brighten, replace dim/test panel (TM 55-1520-238-23).
11. On the dim/test panel, rotate the manual **DIM** control fully counterclockwise.	If pilot **ENG OIL**, **TGT**, **TORQUE**, **FUEL LBX10**, **ENG-RTR**, and **N_G** indicator vertical display lamps do not dim, go to para 8-2-25.
12. On dim/test panel, rotate manual **DIM** control fully clockwise.	If pilot **ENG OIL**, **TGT**, **TORQUE**, **FUEL LBX10**, **ENG-RTR**, and **N_G** indicator vertical display lamps do not brighten, replace dim/test panel (TM 55-1520-238-23).
13. Rotate manual **DIM** control to midposition. Check all pilot engine instruments.	If pilot **TGT** indicator vertical display scales or digital readouts do not indicate ambient temperature (±5 degrees), go to para 8-2-26.
	If pilot **TORQUE** indicator vertical display scales or digital readouts do not indicate between zero and two percent, go to para 8-2-27.
	If pilot **N_G** indicator vertical display scales or digital readouts do not indicate between zero and five percent, go to para 8-2-28.

GO TO NEXT PAGE

8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
	If pilot **FUEL LBX10** indicator vertical display scales or digital readout do not indicate existing fuel (±20 pounds), go to para 8-2-29.
	If pilot **ENG OIL** indicator vertical display scales do not indicate zero pressure, go to para 8-2-30.
	If pilot **ENG-RTR** indicator vertical display scales do not indicate zero percent, go to para 8-2-31.


DGT OFF/NORM/TST SWITCH
DIM/TEST PANEL
PHOTOCELL
DIM CONTROL
TORQUE INDICATOR
FUEL LB X 10 INDICATOR
N_G INDICATOR
TGT INDICATOR
ENG-RTR INDICATOR
ENG OIL INDICATOR
TORQUE %
FUEL LB X 10
N_G RPM %
TGT °C X 100
ENG-RTR RPM %
ENG OIL PSI X 10
FWD
AFT
TOTAL

PILOT ENGINE INSTRUMENTS

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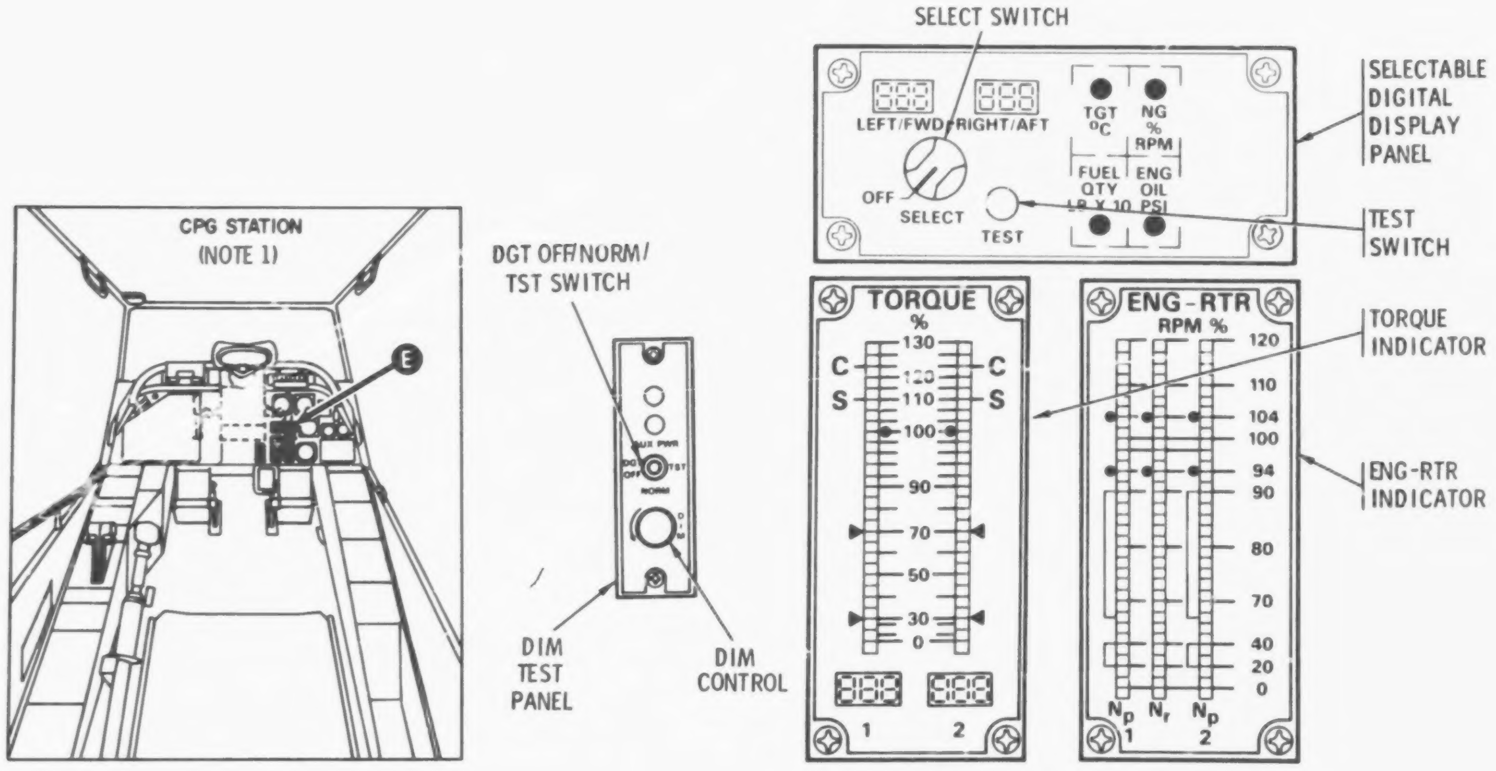
8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
14. On the CPG selectable digital display (SDD) panel, rotate selector switch to **SELECT**. Press the **TEST** switch on the SDD panel. Check all CPG engine instruments.	If all CPG engine instruments have every other vertical display lamp not lighted, replace signal data converter (TM 55-1520-238-23). If any single CPG engine instrument vertical display lamp does not light for three seconds, replace applicable indicator (TM 55-1520-238-23).
15. On the CPG dim/test panel, set the **DGT OFF/NORM/TST** switch to **DGT OFF**. Check CPG SDD and **TORQUE** indicator digital readouts blank.	If all digital readouts remain lighted, go to para 8-2-36. If CPG **TORQUE** indicator digital readouts do not blank, go to para 8-2-37. If CPG SDD panel digital readouts do not blank, go to para 8-2-38.
16. On CPG dim/test panel, set **DGT OFF/NORM/TST** switch to **NORM**, rotate the manual **DIM** control fully counterclockwise and then fully clockwise.	If the brightness of the CPG engine instrument vertical displays and digital readouts do not change, go to para 8-2-39.


SELECT SWITCH
LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST
SELECTABLE DIGITAL DISPLAY PANEL
TEST SWITCH
CPG STATION (NOTE 1)
DGT OFF/NORM/TST SWITCH
AUX PWR
NORM
DIM TEST PANEL
DIM CONTROL
TORQUE %
C S
130
120
110
100
90
70
50
30
0
1
2
ENG-RTR RPM %
120
110
104
100
94
90
80
70
40
20
0
N_p 1
N_r
N_p 2
TORQUE INDICATOR
ENG-RTR INDICATOR
E

E CPG ENGINE INSTRUMENTS

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8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
17. On CPG engine instrument dim/test panel, set **DGT OFF/NORM/TST** switch to **TST**. Check all CPG engine instruments digital readouts and vertical display lamps.	If all CPG engine instruments do not indicate full scale or show digital 8s, go to para 8-2-43. If CPG **TORQUE** indicator does not indicate full scale, or show digital 8s, or vertical display lamps have every other lamp not lighted, go to para 8-2-40. If CPG **ENG-RTR** indicator does not indicate full scale or vertical display lamps have every other lamp not lighted, go to para 8-2-41. If CPG selectable digital display (SDD) panel **LEFT/FWD** or **RIGHT/AFT** indicators do not show digital 8s, go to para 8-2-42.
18. On CPG dim/test panel, set **DGT OFF/NORM/TST** switch to **NORM**.	If all CPG engine instruments digital readouts are blanked, go to para 8-2-44.

TASK	RESULT
19. On CPG SDD panel, rotate **SELECT** switch to **OFF**.	If CPG SDD panel digital readouts are not blanked out, replace the SDD panel (TM 55-1520-238-23). If CPG engine instrument indicators are not blanked out, go to para 8-2-45. If CPG **TORQUE** indicator digital readouts are not blanked out, go to para 8-2-46.
20. On SDD panel, rotate **SELECT** switch to each of the discrete clockwise positions and check the respective **LEFT/FWD** and **RIGHT/AFT** digital readouts. SDD indicators will light as **SELECT** switch is rotated.	If any indicators do not light when selected, replace the SDD panel (TM 55-1520-238-23). If CPG SDD panel **TGT** digital readouts do not indicate ambient temperature ±5 degrees when **TGT** indicator lights, go to para 8-2-47. If CPG SDD panel **N_G** digital readouts do not indicate within one-half percent when **N_G** indicator lights, go to para 8-2-48. If CPG SDD panel **FUEL QTY LBX10** digital readouts do not indicate existing fuel ±20 pounds when **FUEL QTY LBX10** indicator lights, go to para 8-2-49. If CPG SDD panel **ENG OIL** digital readouts do not indicate zero to five pounds pressure when **ENG OIL** indicator lights, go to para 8-2-50. If CPG **TORQUE** indicator vertical display scales and digital readouts do not indicate zero to two percent, go to para 8-2-51. If CPG **ENG-RTR** indicator vertical display scales do not indicate zero percent, go to para 8-2-52.
21. Rotate select switch to **OFF**.	

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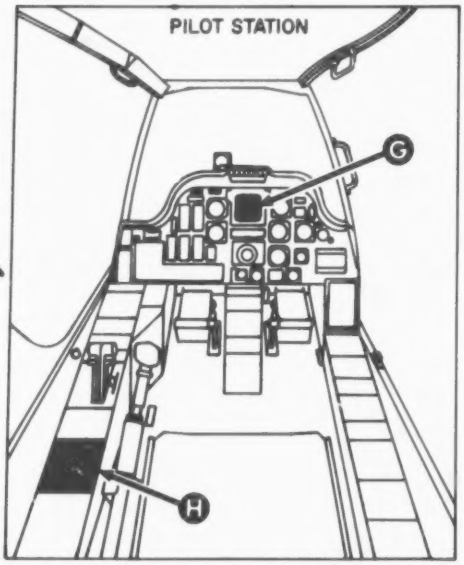
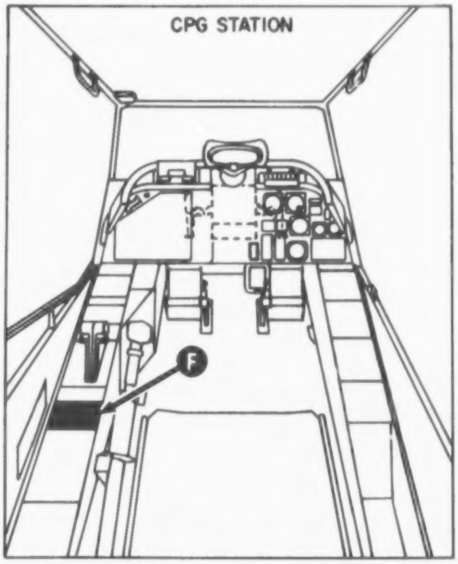
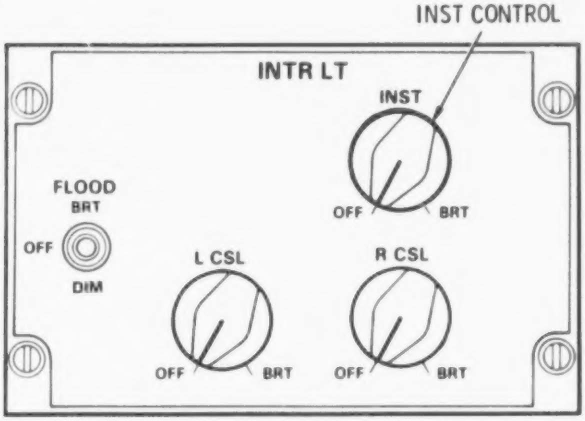
8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
22. On CPG **INTR LT** panel rotate the **INST** control switch to **BRT**. Check all CPG engine instruments.	If CPG SDD, dim/test panels, and CPG **TORQUE** and CPG **ENG-RTR** indicators edge-lighting does not light, refer to chapter 9 to troubleshoot CPG edge-lighting. If SDD panel edge-lighting does not light, go to para 8-2-53. If CPG **TORQUE** indicator edge-lighting does not light, go to para 8-2-54. If CPG **ENG-RTR** indicator edge-lighting does not light, go to para 8-2-55. If CPG dim/test panel edge-lighting does not light, go to para 8-2-56 (helicopters with dim/test panel installed).
23. Rotate the **INST** control switch to **OFF**.	

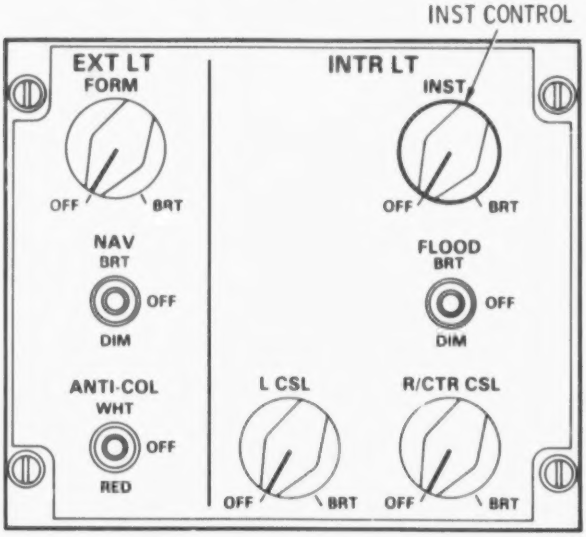




TASK	RESULT
24. On pilot **EXT LT/INTR LT** panel, rotate **INST** control switch to **BRT**. Check all pilot engine instruments.	If dim/test panel, **FUEL LBX10** and **ENG OIL** indicators do not light, refer to chapter 9 to troubleshoot pilot edge-lighting. If **TORQUE**, **TGT**, **N_G** and **ENG-RTR** indicators do not light, refer to chapter 9 to troubleshoot pilot edge-lighting. If pilot dim/test panel edge-lighting does not light, go to para 8-2-57. If pilot **TGT** indicator edge-lighting does not light, go to para 8-2-58. If pilot **TORQUE** indicator edge-lighting does not light, go to para 8-2-59. If pilot **FUEL LBX10** indicator edge-lighting does not light, go to para 8-2-60. If pilot **N_G** indicator edge-lighting does not light, go to para 8-2-61. If pilot **ENG-RTR** indicator edge-lighting does not light, go to para 8-2-62. If pilot **ENG OIL** indicator edge-lighting does not light, go to para 8-2-63.


INST CONTROL
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R CSL
OFF
BRT

F CPG INTR LT PANEL


INST CONTROL
EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI-COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R/CTR CSL
OFF
BRT

H PILOT EXT LT/INTR LT PANEL

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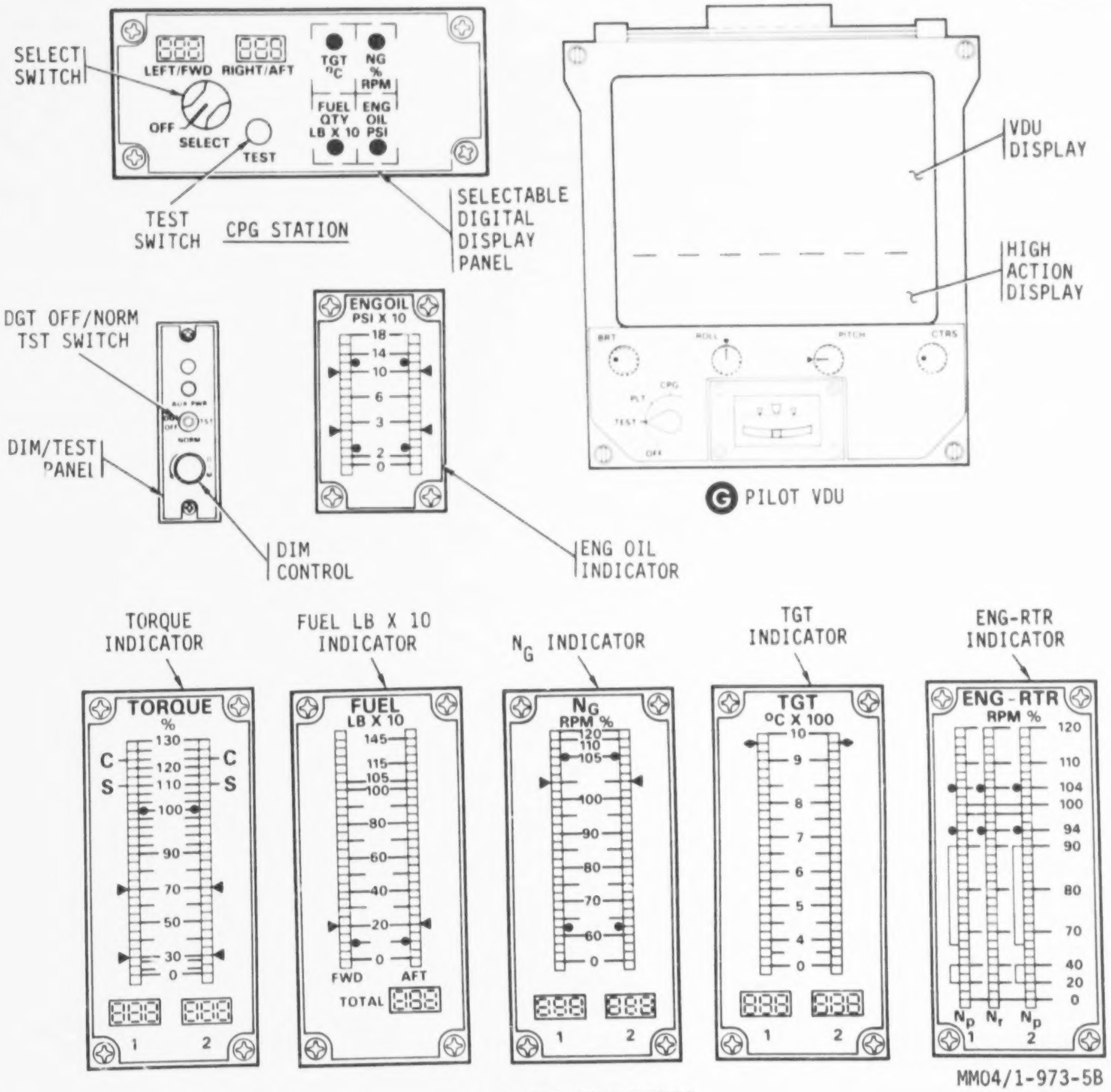
8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
25. Rotate **INST** control switch to OFF. NOTE • For helicopters Ser. No. 84-2412 and subsequent, go to step 26. • For helicopters Ser. No. 82-23355 thru 84-24211, go to step 27.	
26. For helicopters Ser. No. 84-24212 and subsequent, start engines 1 and 2 with VDU operating (TM 55-1520-238-CL). Check that engine instrument indications are visible on pilot and CPG **N$_G$**, **TGT**, **ENG-RTR**, **TORQUE** and **ENG OIL** indicators, and CPG selectable digital display panel.	If pilot and CPG **ENG OIL** pressure indicator does not indicate engine 1 oil pressure, go to para 8-2-64. If pilot and CPG **ENG OIL** pressure indicator does not indicate engine 2 oil pressure, go to para 8-2-65. If CPG SDD panel does not indicate engine 1 or engine 2 oil pressure, go to para 8-2-67. If pilot and CPG **TORQUE** indicators do not indicate engine 1 torque, go to para 8-2-66. If pilot **TORQUE** indicator does not indicate engine 1 torque, go to para 8-2-68. If CPG **TORQUE** indicator does not indicate engine 1 torque, go to para 8-2-69. If pilot and CPG **TORQUE** indicators do not indicate engine 2 torque, go to para 8-2-70. If pilot **TORQUE** indicator does not indicate engine 2 torque, go to para 8-2-71. If CPG **TORQUE** indicator does not indicate engine 2 torque, go to para 8-2-72. If engine torque display on pilot VDU flashes, go to para 8-2-73.


SELECT SWITCH
LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST
TEST SWITCH
CPG STATION
SELECTABLE DIGITAL DISPLAY PANEL
VDU DISPLAY
HIGH ACTION DISPLAY
BRT
ROLL
PITCH
CTRS
PLT
CPG
TEST
OFF
G PILOT VDU
DGT OFF/NORM TST SWITCH
DIM/TEST PANEL
DIM CONTROL
ENG OIL PSI X 10
ENG OIL INDICATOR
TORQUE INDICATOR
FUEL LB X 10 INDICATOR
N$_G$ INDICATOR
TGT INDICATOR
ENG-RTR INDICATOR
TORQUE %
C
S
FUEL LB X 10
FWD
AFT
TOTAL
N$_G$ RPM %
TGT °C X 100
ENG-RTR RPM %
N$_p$ 1
N$_r$
N$_p$ 2
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ENGINE INSTRUMENTS

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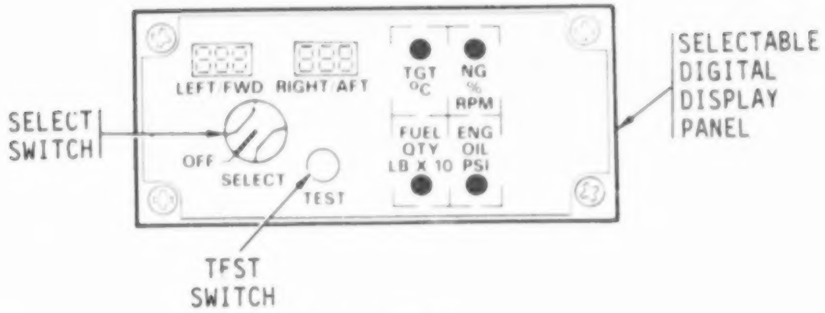
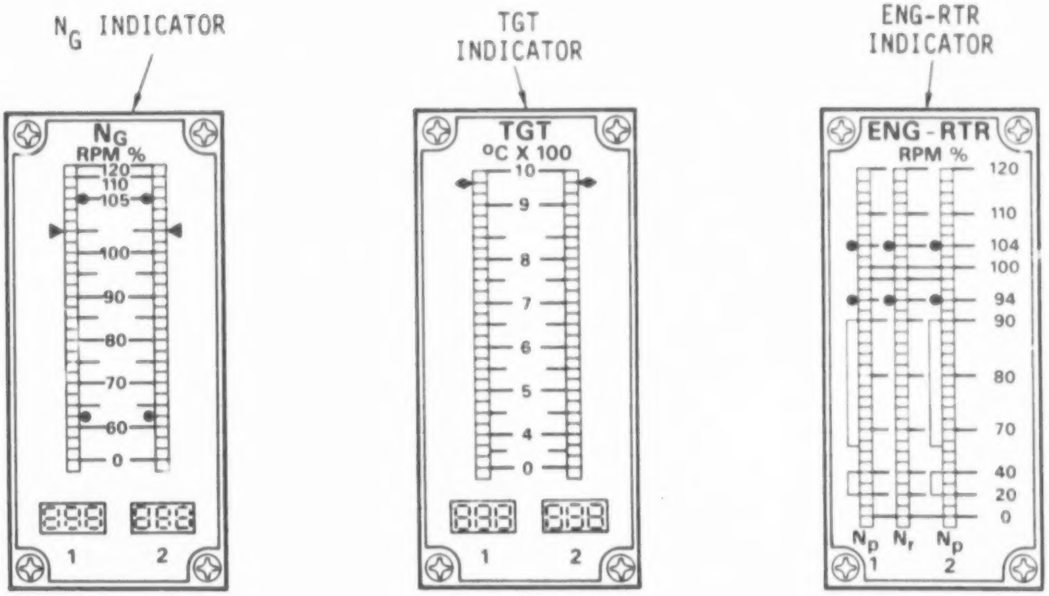
8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
26. (cont)	If pilot and CPG **ENG-RTR** indicators do not indicate engine 1 N_p, go to para 8-2-74.
	If pilot and CPG **ENG-RTR** indicators do not indicate engine 2 N_p, go to para 8-2-75.
	If pilot **ENG-RTR** indicator does not indicate engine 1 N_p, go to para 8-2-76.
	If CPG **ENG-RTR** indicator does not indicate engine 1 N_p, go to para 8-2-77.
	If pilot **ENG-RTR** indicator does not indicate engine 2 N_p, go to para 8-2-78.
	If CPG **ENG-RTR** indicator does not indicate engine 2 N_p, go to para 8-2-79.
	If pilot and CPG **ENG-RTR** indicators do not indicate N_r, go to para 8-2-80.
	If pilot **ENG-RTR** indicator does not indicate N_r, go to para 8-2-81.
	If CPG **ENG-RTR** indicator does not indicate N_r, go to para 8-2-82.
	If pilot $\mathbf{N_G}$ indicator does not indicate engine 1 $\mathbf{N_G}$, go to para 8-2-83.
	If pilot $\mathbf{N_G}$ indicator does not indicate engine 2 $\mathbf{N_G}$, go to para 8-2-84.
	If CPG selectable digital display panel does not indicate engine 1 and/or engine 2 N_G, go to para 8-2-85.
	If pilot **TGT** indicator does not indicate engine 1 TGT, go to para 8-2-86.
	If pilot **TGT** indicator does not indicate engine 2 TGT, go to para 8-2-87.
	If CPG selectable digital panel does not indicate engine 1 and/or engine 2 TGT, go to para 8-2-88.

GO TO STEP 28.


SELECTABLE DIGITAL DISPLAY PANEL
LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
SELECT SWITCH
OFF
SELECT
TEST
TEST SWITCH

CPG STATION


N_G INDICATOR
N_G RPM %
120
110
105
100
90
80
70
60
0
1
2
TGT INDICATOR
TGT °C X 100
10
9
8
7
6
5
4
0
1
2
ENG-RTR INDICATOR
ENG-RTR RPM %
120
110
104
100
94
90
80
70
40
20
0
N_p 1
N_r
N_p 2

MM04/1-973-8

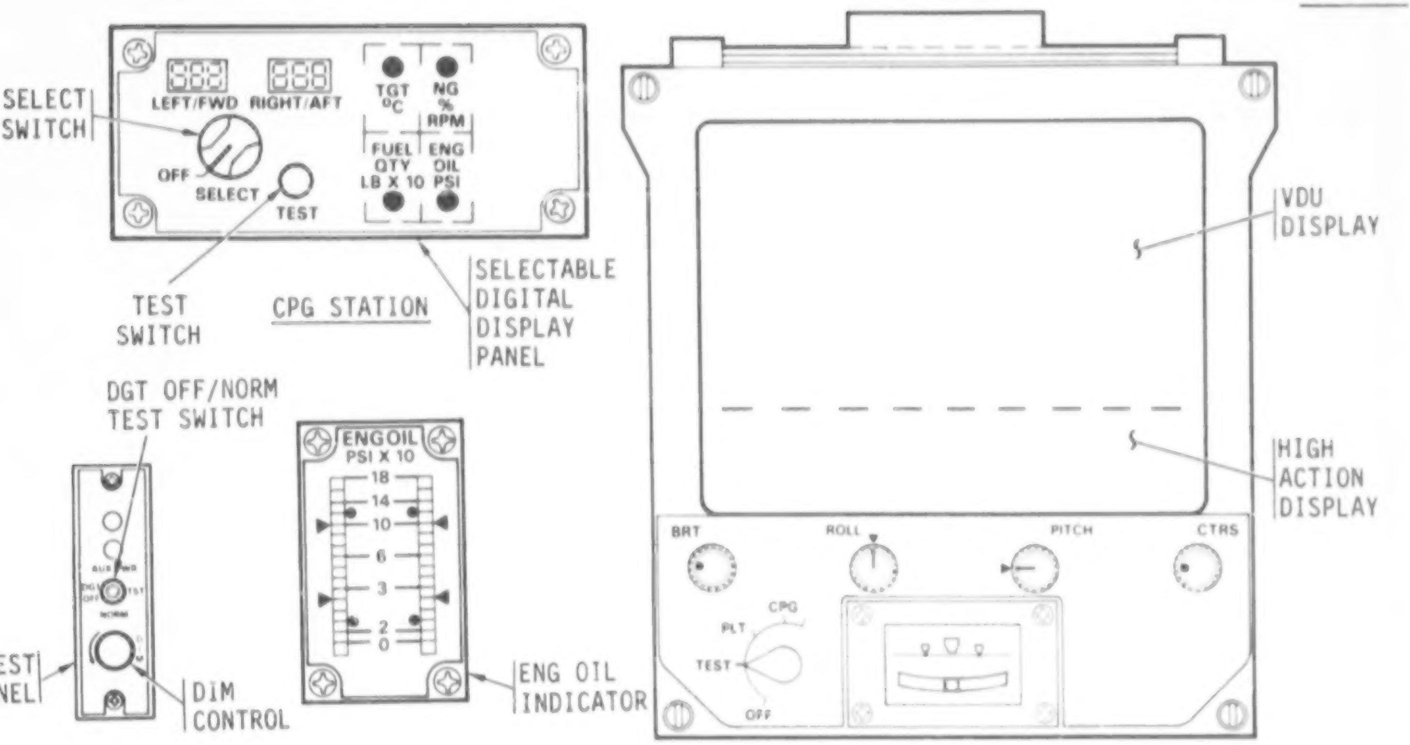
ENGINE INSTRUMENTS

END OF TASK

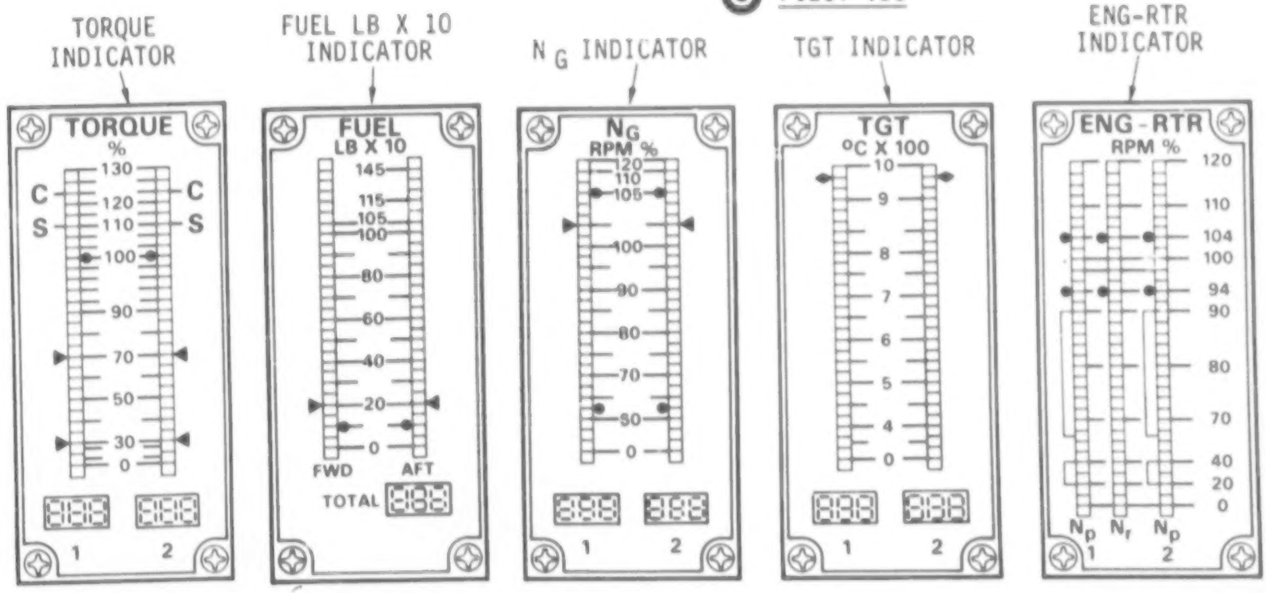
8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
27. For helicopters Ser. No. 82-23355 thru 84-24211, start engines 1 and 2 with VDU operating (TM 55-1520-238-CL). Check that engine instrument indications are visible on pilot and CPG **N_G**, **TGT**, **ENG-RTR**, **TORQUE** and **ENG OIL** indicators, and CPG selectable digital display panel.	If pilot and CPG **ENG OIL** pressure indicator does not indicatc engine 1 oil pressure, go to para 8-2-64. If pilot and CPG **ENG OIL** pressure indicator does not indicate engine 2 oil pressure, go to para 8-2-65. If CPG SDD panel does not indiccate engine 1 or engine 2 oil pressure, go to para 8-2-67. If pilot and CPG **TORQUE** indicators do not indicate engine 1 torque, go to para 8-2-89. If pilot **TORQUE** indicator does not indicate engine 1 torque, go to para 8-2-68. If CPG **TORQUE** indicator does not indicate engine 1 torque, go to para 8-2-69. If pilot and CPG **TORQUE** indicators do not indicate engine 2 torque, go to para 8-2-90. If pilot **TORQUE** indicator does not indicate engine 2 torque, go to para 8-2-71. If CPG **TORQUE** indicator does not indicate engine 2 torque, go to para 8-2-72. If engine torque display on pilot VDU flashes, go to para 8-2-73.

8-2-1


SELECT SWITCH
LEFT/FWD
RIGHT/AFT
OFF
SELECT
TEST
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
TEST SWITCH
CPG STATION
SELECTABLE DIGITAL DISPLAY PANEL
DGT OFF/NORM TEST SWITCH
EST
NEL
DIM CONTROL
ENG OIL PSI X 10
18
14
10
6
3
2
0
ENG OIL INDICATOR
VDU DISPLAY
HIGH ACTION DISPLAY
BRT
ROLL
PITCH
CTRS
CPG
PLT
TEST
OFF

G PILOT VDU


TORQUE INDICATOR
TORQUE %
130
120
110
100
90
70
50
30
0
C
S
1
2
FUEL LB X 10 INDICATOR
FUEL LB X 10
145
115
105
100
80
60
40
20
0
FWD
AFT
TOTAL
N G INDICATOR
N G RPM %
120
110
105
100
90
80
70
50
0
TGT INDICATOR
TGT °C X 100
10
9
8
7
6
5
4
0
ENG-RTR INDICATOR
ENG-RTR RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2

ENGINE INSTRUMENTS

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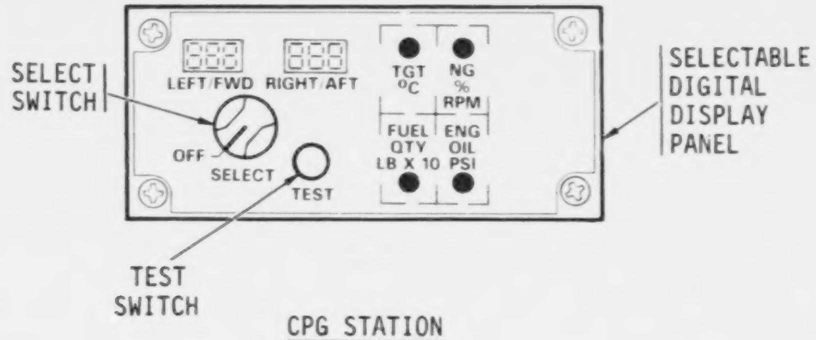
GO TO NEXT PAGE

8-2-1. ENGINE INSTRUMENTS - OPERATIONAL CHECK (cont)

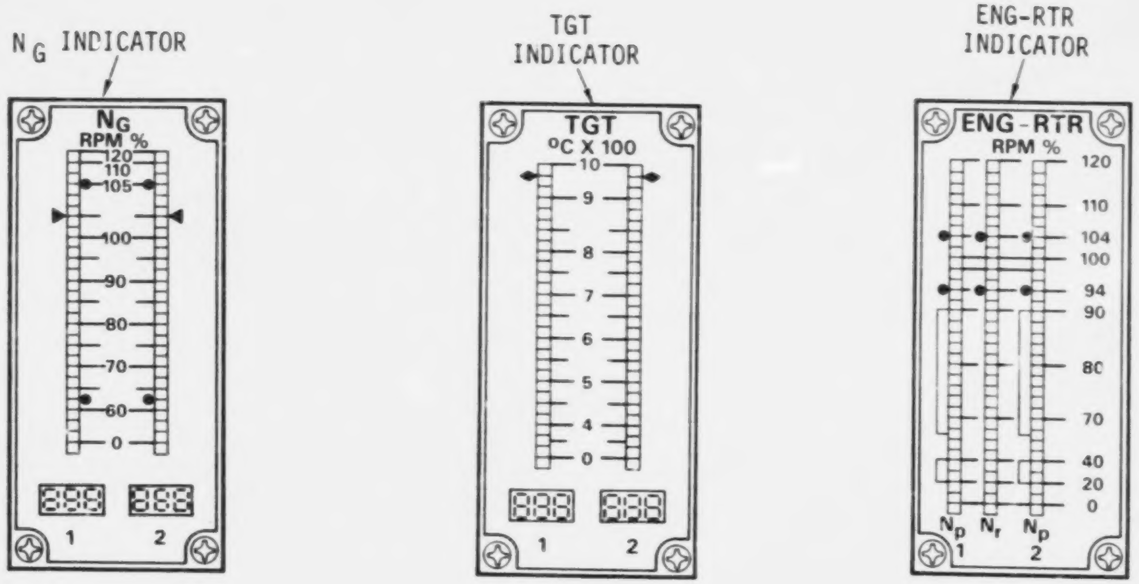
TASK	RESULT
27. (cont)	If pilot and CPG **ENG-RTR** indicators do not indicate engine 1 N_p, go to para 8-2-74.
	If pilot and CPG **ENG-RTR** indicators do not indicate engine 2 N_p, go to para 8-2-75.
	If pilot **ENG-RTR** indicator does not indicate engine 1 N_p, go to para 8-2-76.
	If CPG **ENG-RTR** indicator does not indicate engine 1 N_p, go to para 8-2-77.
	If pilot **ENG-RTR** indicator does not indicate engine 2 N_p, go to para 8-2-78.
	If CPG **ENG-RTR** indicator does not indicate engine 2 N_p, go to para 8-2-79.
	If pilot and CPG **ENG-RTR** indicators do not indicate N_r, go to para 8-2-80.
	If pilot **ENG-RTR** indicator does not indicate N_r, go to para 8-2-81.
	If CPG **ENG-RTR** indicator does not indicate N_r, go to para 8-2-82.
	If pilot **N_G** indicator does not indicate engine 1 N_G, go to para 8-2-83.
	If pilot **N_G** indicator does not indicate engine 2 N_G, go to para 8-2-84.
	If CPG selectable digital display panel does not indicate engine 1 and/or engine 2 N_G, go to para 8-2-85.
	If pilot **TGT** indicator does not indicate engine 1 TGT, go to para 8-2-86.
	If pilot **TGT** indicator does not indicate engine 2 TGT, go to para 8-2-87.
	If CPG selectable digital panel does not indicate engine 1 and/or engine 2 TGT, go to para 8-2-88.

TASK	RESULT
28. Shutdown engines 1 and 2 (TM 55-1520-238-CL).	

C. Remove electrical power - Electrical (TM 55-1520-238-23).


SELECT SWITCH
LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST
TEST SWITCH
SELECTABLE DIGITAL DISPLAY PANEL

CPG STATION


N G INDICATOR
TGT INDICATOR
ENG-RTR INDICATOR
NG RPM %
120
110
105
100
90
80
70
60
0
1
2
TGT °C X 100
10
9
8
7
6
5
4
0
ENG-RTR RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2

ENGINE INSTRUMENTS

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(All data in paragraphs 8-2-2 and 8-2-3 deleted)

END OF TASK

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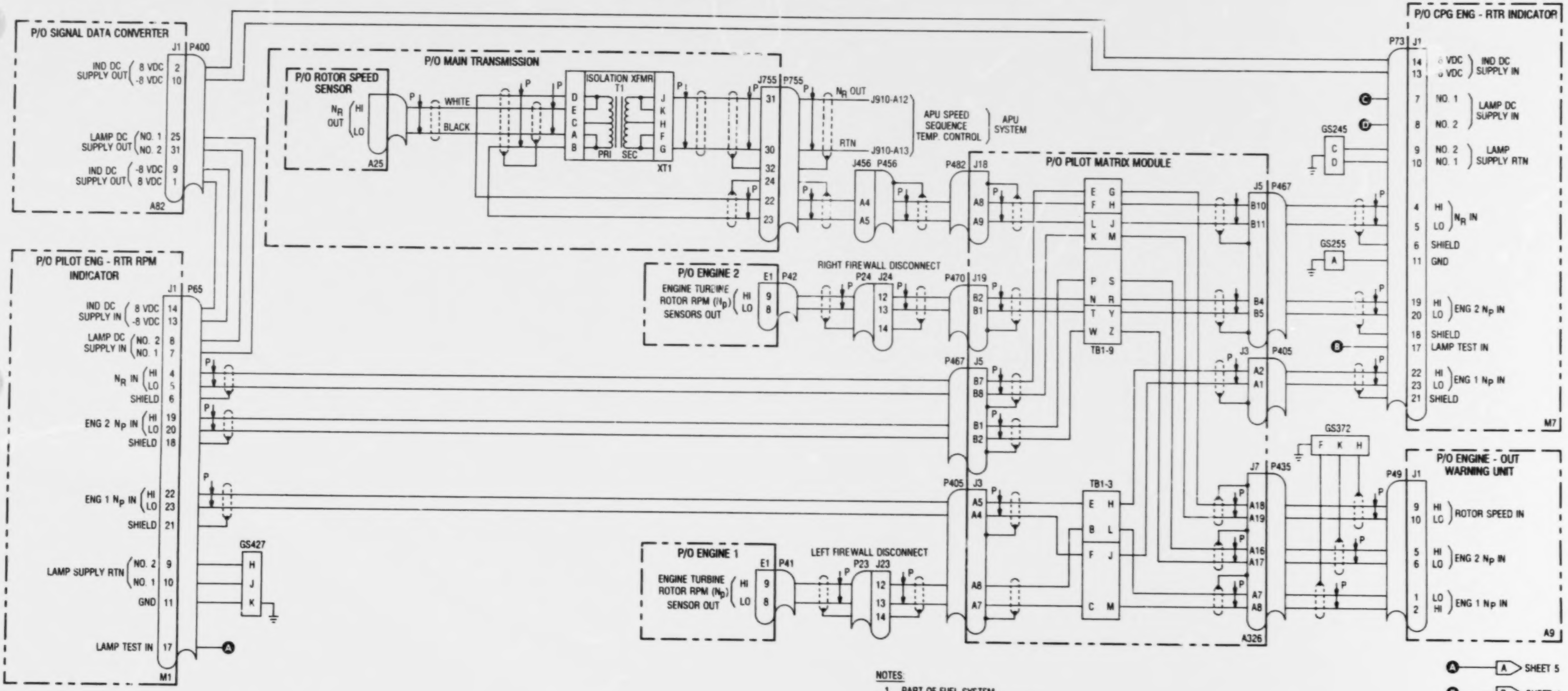
8-2-4. ENGINE INSTRUMENTS - INTERCONNECTION DIAGRAM


P/O SIGNAL DATA CONVERTER
J1 P400
IND DC SUPPLY OUT 8 VDC 2
-8 VDC 10
LAMP DC SUPPLY OUT NO. 1 25
NO. 2 31
IND DC SUPPLY OUT -8 VDC 9
8 VDC 1
A82
P/O PILOT ENG - RTR RPM INDICATOR
J1 P65
IND DC SUPPLY IN 8 VDC 14
-8 VDC 13
LAMP DC SUPPLY IN NO. 2 8
NO. 1 7
N_R IN HI 4
LO 5
SHIELD 6
ENG 2 N_P IN HI 19
LO 20
SHIELD 18
ENG 1 N_P IN HI 22
LO 23
SHIELD 21
LAMP SUPPLY RTN NO. 2 9
NO. 1 10
GND 11
LAMP TEST IN 17
M1
GS427 H J K
P/O MAIN TRANSMISSION
P/O ROTOR SPEED SENSOR
N_R OUT HI LO
A25
WHITE
BLACK
ISOLATION XFMR T1
D E C A B
J K H F G
PRI SEC
XT1
J755 P755
31 30 32 24 22 23
N_R OUT J910-A12
RTN J910-A13
APU SPEED SEQUENCE TEMP. CONTROL
APU SYSTEM
J456 P456 A4 A5
P482 J18 A8 A9
P/O PILOT MATRIX MODULE
E G F H L J K M P S N R T Y W Z
TB1-9
J5 P467 B10 B11 B4 B5
P/O ENGINE 2
ENGINE TURBINE ROTOR RPM (N_P) SENSORS OUT HI 9 LO 8
E1 P42
RIGHT FIREWALL DISCONNECT
P24 J24 12 13 14
P470 J19 B2 B1
P467 J5 B7 B8 B1 B2
J3 P405 A2 A1
P405 J3 A5 A4 A8 A7
TB1-3 E H B L F J C M
J7 P435 A18 A19 A16 A17 A7 A8
A326
GS372 F K H
P/O ENGINE 1
ENGINE TURBINE ROTOR RPM (N_P) SENSOR OUT HI 9 LO 8
E1 P41
LEFT FIREWALL DISCONNECT
P23 J23 12 13 14
P/O CPG ENG - RTR INDICATOR
P73 J1
14 8 VDC 13 -8 VDC IND DC SUPPLY IN
7 NO. 1 8 NO. 2 LAMP DC SUPPLY IN
GS245 C D
9 NO. 2 10 NO. 1 LAMP SUPPLY RTN
4 HI 5 LO N_R IN
6 SHIELD
GS255 A
11 GND
19 HI 20 LO ENG 2 N_P IN
18 SHIELD
17 LAMP TEST IN
22 HI 23 LO ENG 1 N_P IN
21 SHIELD
M7
P/O ENGINE - OUT WARNING UNIT
P49 J1
9 HI 10 LO ROTOR SPEED IN
5 HI 6 LO ENG 2 N_P IN
1 LO 2 HI ENG 1 N_P IN
A9
P
A B C D

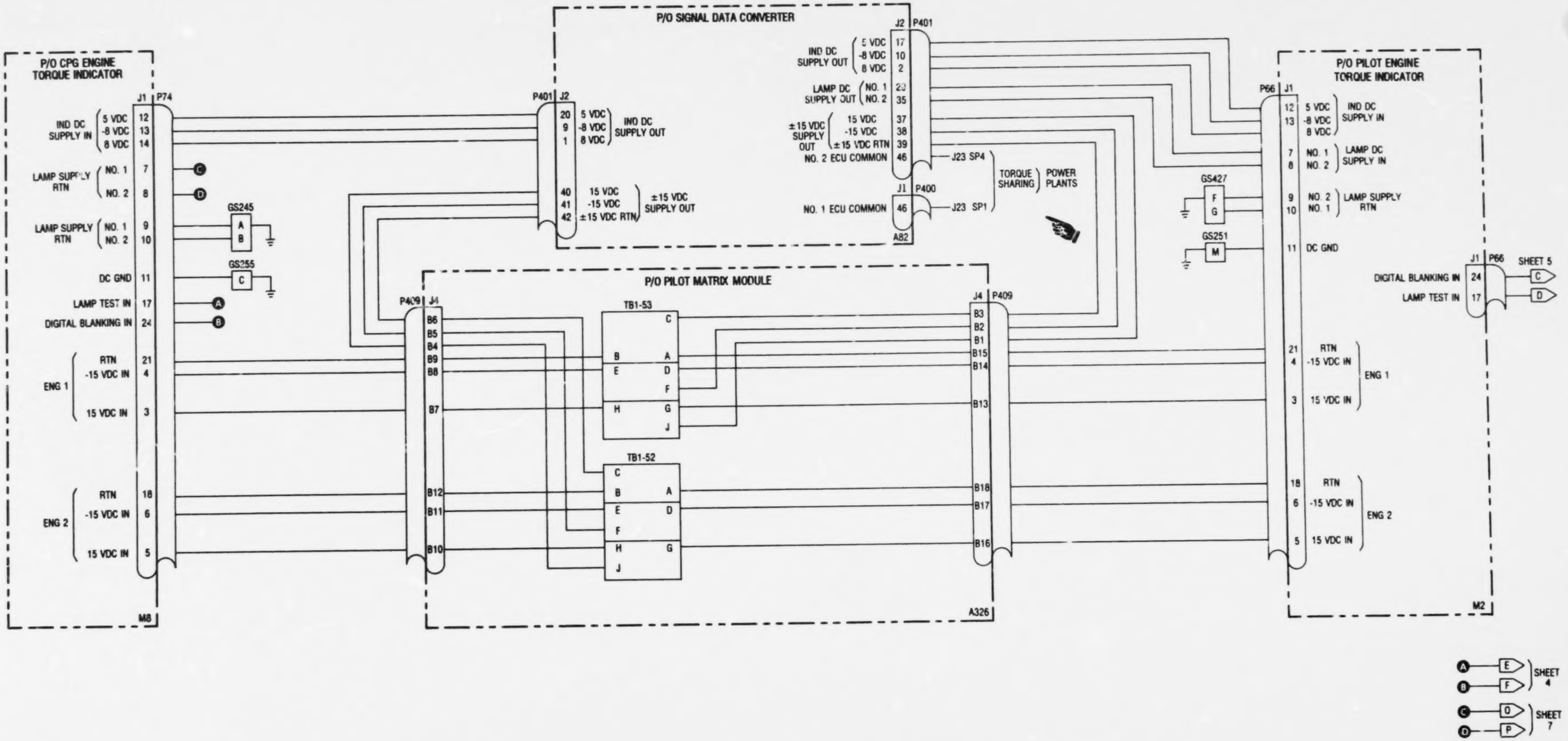
NOTES:

1. PART OF FUEL SYSTEM.
2. PART OF FLIGHT CONTROL SYSTEM.
3. ALL ITEMS SHOWN, EXCEPT INSTRUMENT INDICATORS, ENGINE-OUT WARNING UNIT, SIGNAL DATA CONVERTER, FUEL SIGNAL CONDITIONER, AND PILOT FUEL QUANTITY INDICATOR, ARE PART OF THE ELECTRICAL SYSTEM (UNLESS OTHERWISE INDICATED).

Ⓐ — A SHEET 5
Ⓑ — B SHEET 4
Ⓒ — M SHEET 7
Ⓓ — N SHEET 7

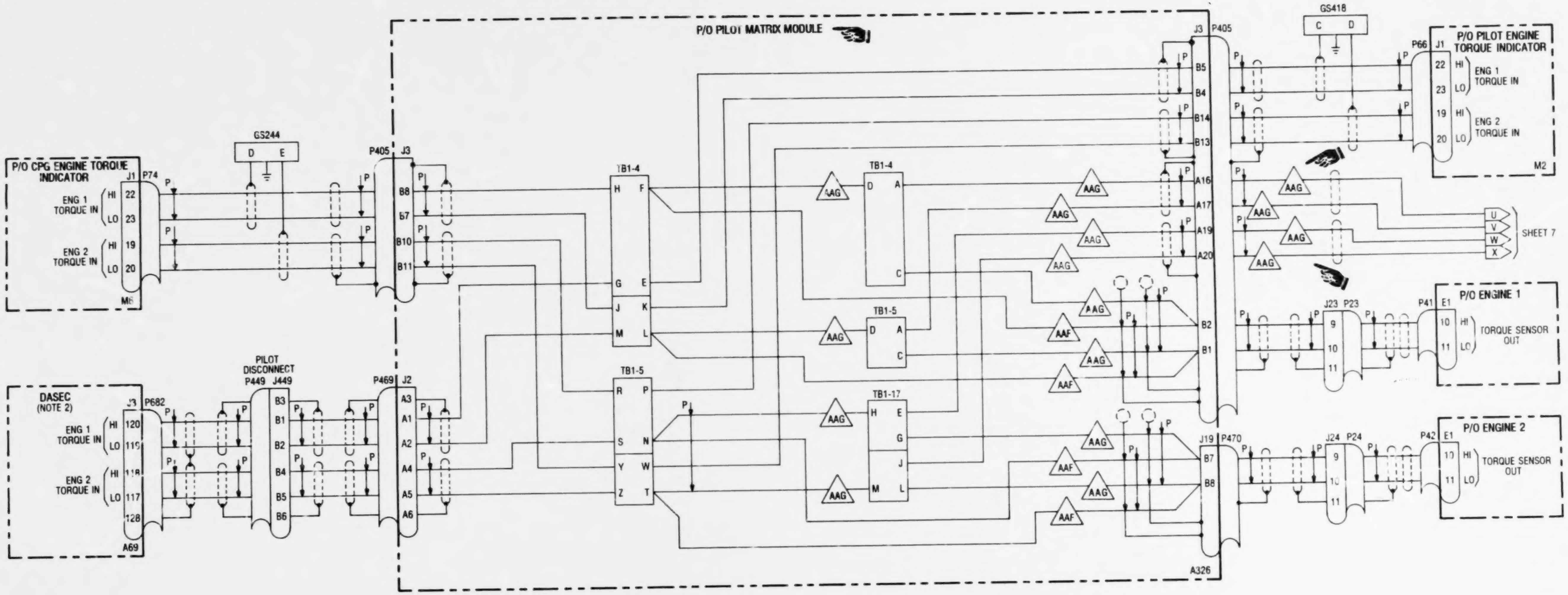
SHEET 1 OF 7 MM04/1-899-1H

8-2-4. ENGINE INSTRUMENTS - INTERCONNECTION DIAGRAM


P/O SIGNAL DATA CONVERTER
P/O CPG ENGINE TORQUE INDICATOR
J1 P74
IND DC SUPPLY IN 5 VDC 12 -8 VDC 13 8 VDC 14
LAMP SUPPLY RTN NO. 1 7 NO. 2 8
LAMP SUPPLY RTN NO. 1 9 NO. 2 10
GS245 A B
DC GND 11
GS255 C
LAMP TEST IN 17
DIGITAL BLANKING IN 24
ENG 1 RTN 21 -15 VDC IN 4 15 VDC IN 3
ENG 2 RTN 18 -15 VDC IN 6 15 VDC IN 5
M8
P401 J2
20 5 VDC 9 -8 VDC 1 8 VDC IND DC SUPPLY OUT
40 15 VDC 41 -15 VDC 42 ±15 VDC RTN ±15 VDC SUPPLY OUT
J2 P401
IND DC SUPPLY OUT 5 VDC 17 -8 VDC 10 8 VDC 2
LAMP DC SUPPLY OUT NO. 1 23 NO. 2 35
±15 VDC SUPPLY OUT 15 VDC 37 -15 VDC 38 ±15 VDC RTN 39
NO. 2 ECU COMMON 46
J23 SP4
TORQUE SHARING
POWER PLANTS
J1 P400
NO. 1 ECU COMMON 46
J23 SP1
A82
P/O PILOT MATRIX MODULE
P409 J4
B6 B5 B4 B9 B8 B7 B12 B11 B10
TB1-53 C B A E D F H G J
TB1-52 C B A E D F H G J
J4 P409
B3 B2 B1 B15 B14 B13 B18 B17 B16
A326
P/O PILOT ENGINE TORQUE INDICATOR
P66 J1
12 5 VDC 13 -8 VDC 8 VDC IND DC SUPPLY IN
7 NO. 1 8 NO. 2 LAMP DC SUPPLY IN
GS427 F G
9 NO. 2 10 NO. 1 LAMP SUPPLY RTN
GS251 M
11 DC GND
J1 P66
DIGITAL BLANKING IN 24
LAMP TEST IN 17
SHEET 5 C D
21 RTN 4 -15 VDC IN 3 15 VDC IN ENG 1
18 RTN 6 -15 VDC IN 5 15 VDC IN ENG 2
M2
A E B F SHEET 4
C D D P SHEET 7

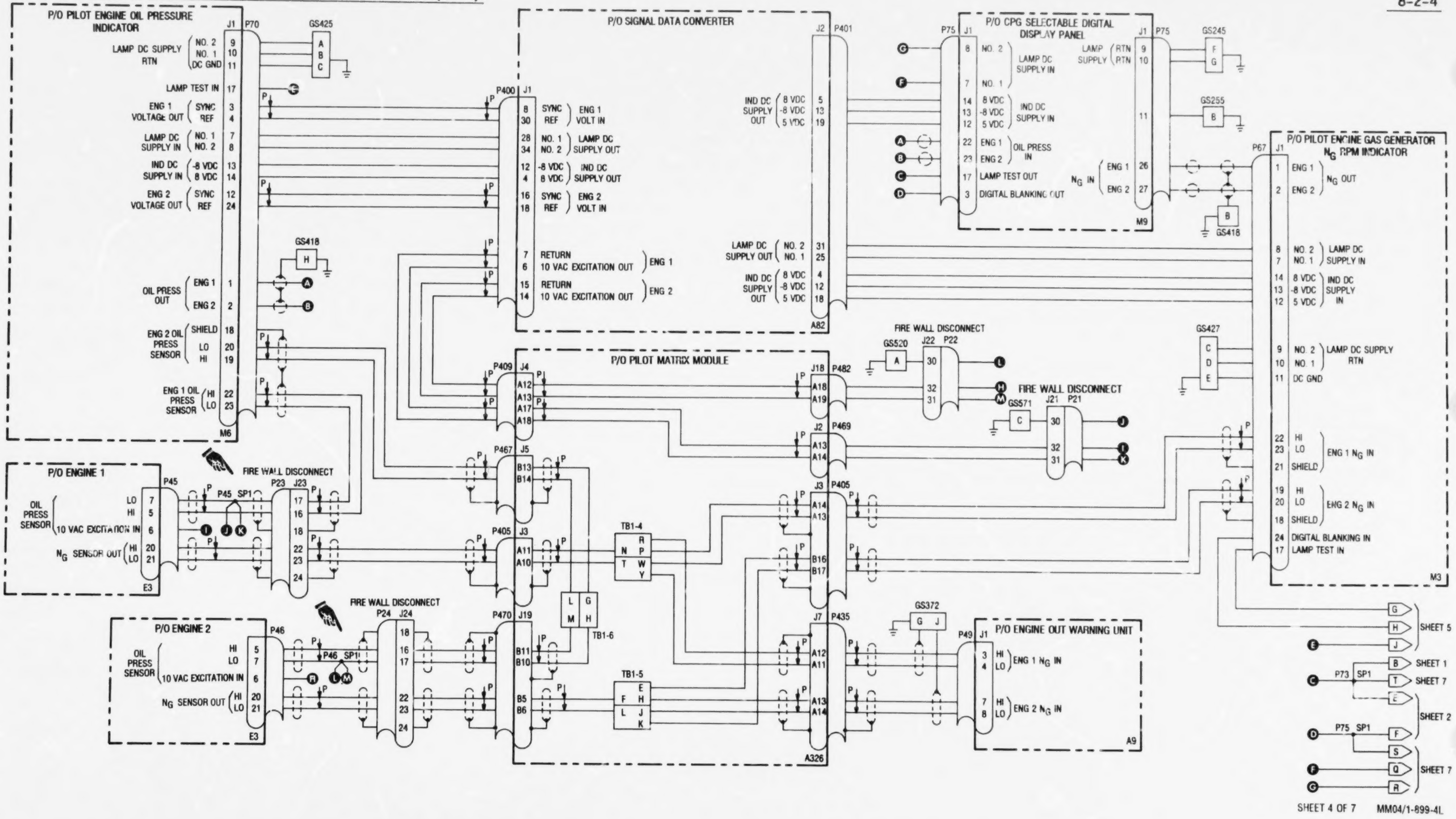
SHEET 2 OF 7 MM04/1-899-2I

8-2-4. ENGINE INSTRUMENTS - INTERCONNECTION DIAGRAM (cont)


P/O PILOT MATRIX MODULE
A326
P/O CPG ENGINE TORQUE INDICATOR
M8
J1
P74
ENG 1 TORQUE IN
HI 22
LO 23
ENG 2 TORQUE IN
HI 19
LO 20
GS244
D
E
P405
J3
B8
B7
B10
B11
DASEC (NOTE 2)
A69
J3
P682
ENG 1 TORQUE IN
HI 120
LO 119
ENG 2 TORQUE IN
HI 118
LO 117
128
PILOT DISCONNECT
P449
J449
B3
B1
B2
B4
B5
B6
P469
J2
A3
A1
A2
A4
A5
A6
TB1-4
H
F
G
E
J
K
M
L
TB1-5
R
P
S
N
Y
W
Z
T
TB1-4
D
A
C
TB1-5
D
A
C
TB1-17
H
E
G
J
M
L
AAG
AAF
P
J3
P405
B5
B4
B14
B13
A16
A17
A19
A20
B2
B1
J19
P470
B7
B8
GS418
C
D
P/O PILOT ENGINE TORQUE INDICATOR
M2
P66
J1
22 HI
23 LO
ENG 1 TORQUE IN
19 HI
20 LO
ENG 2 TORQUE IN
U
V
W
X
SHEET 7
P/O ENGINE 1
J23
P23
9
10
11
P41
E1
10 HI
11 LO
TORQUE SENSOR OUT
P/O ENGINE 2
J24
P24
9
10
11
P42
E1
10 HI
11 LO
TORQUE SENSOR OUT

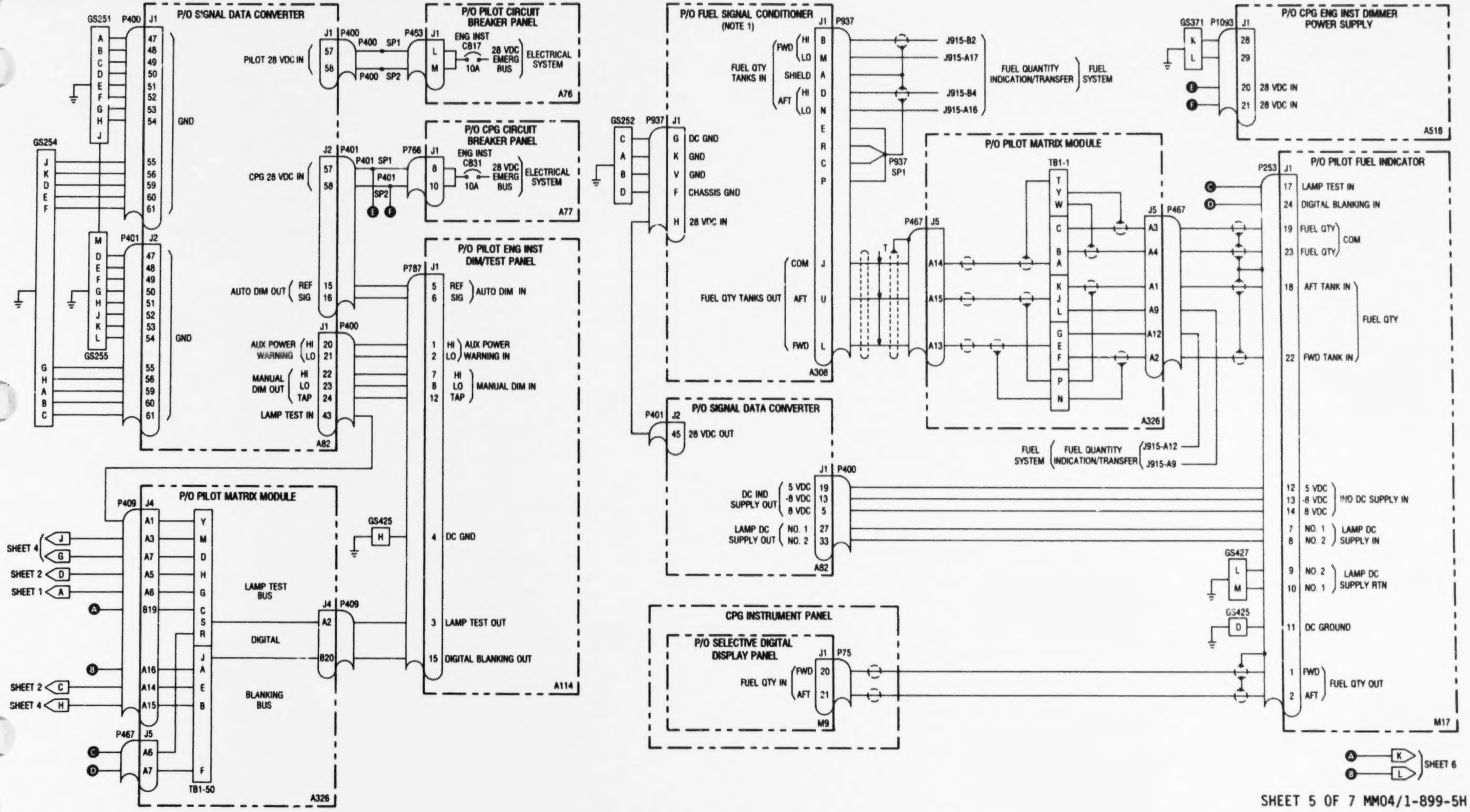
SHEET 3 OF 7 MM04/1-899-3H

8-2-4. ENGINE INSTRUMENTS - INTERCONNECTION DIAGRAM (cont)


P/O PILOT ENGINE OIL PRESSURE INDICATOR
LAMP DC SUPPLY RTN
NO. 2
NO. 1
DC GND
LAMP TEST IN
ENG 1 VOLTAGE OUT
SYNC
REF
LAMP DC SUPPLY IN
IND DC SUPPLY IN
-8 VDC
8 VDC
ENG 2 VOLTAGE OUT
OIL PRESS OUT
ENG 1
ENG 2
ENG 2 OIL PRESS SENSOR
SHIELD
LO
HI
ENG 1 OIL PRESS SENSOR
M6
J1
P70
GS425
GS418
P/O SIGNAL DATA CONVERTER
P400
J2
P401
ENG 1 VOLT IN
LAMP DC SUPPLY OUT
IND DC SUPPLY OUT
ENG 2 VOLT IN
RETURN
10 VAC EXCITATION OUT
ENG 1
ENG 2
IND DC SUPPLY OUT
8 VDC
-8 VDC
5 VDC
LAMP DC SUPPLY OUT
A82
P/O CPG SELECTABLE DIGITAL DISPLAY PANEL
P75
LAMP DC SUPPLY IN
IND DC SUPPLY IN
OIL PRESS IN
LAMP TEST OUT
DIGITAL BLANKING OUT
LAMP SUPPLY
RTN
N_G IN
M9
GS245
GS255
GS418
P/O PILOT ENGINE GAS GENERATOR N_G RPM INDICATOR
P67
N_G OUT
LAMP DC SUPPLY IN
IND DC SUPPLY IN
LAMP DC SUPPLY RTN
DC GND
ENG 1 N_G IN
ENG 2 N_G IN
SHIELD
DIGITAL BLANKING IN
LAMP TEST IN
M3
GS427
P/O PILOT MATRIX MODULE
P409
J4
P467
J5
P405
J3
P470
J19
J18
P482
J2
P469
J7
P435
A326
FIRE WALL DISCONNECT
GS520
J22
P22
GS571
J21
P21
TB1-4
TB1-5
TB1-6
P/O ENGINE 1
OIL PRESS SENSOR
10 VAC EXCITATION IN
N_G SENSOR OUT
P45
P45 SP1
P23
J23
E3
P/O ENGINE 2
P46
P46 SP1
P24
J24
GS372
P/O ENGINE OUT WARNING UNIT
P49
ENG 1 N_G IN
ENG 2 N_G IN
A9
SHEET 5
SHEET 1
SHEET 7
P73 SP1
SHEET 2
P75 SP1
SHEET 7

SHEET 4 OF 7 MM04/1-899-4L

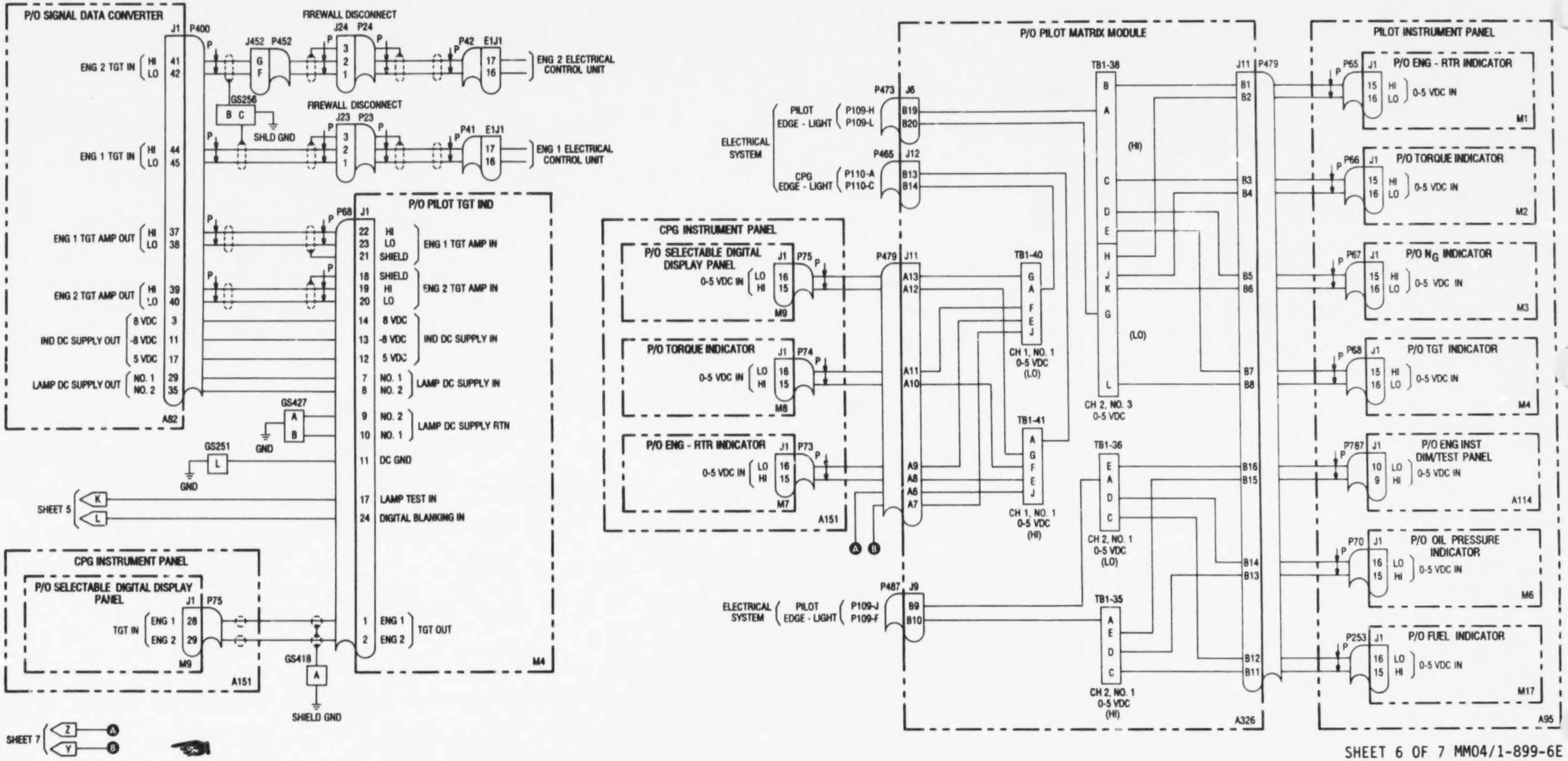
8-2-4. ENGINE INSTRUMENTS - INTERCONNECTION DIAGRAM (cont)



P/O SIGNAL DATA CONVERTER
GS251
P400
J1
GS254
GS255
P401
J2
GND
A82
PILOT 28 VDC IN
CPG 28 VDC IN
P/O PILOT CIRCUIT BREAKER PANEL
P453
ENG INST CB17 10A
28 VDC EMERG BUS
ELECTRICAL SYSTEM
A76
P/O CPG CIRCUIT BREAKER PANEL
P766
ENG INST CB31 10A
A77
SP1
SP2
AUTO DIM OUT
REF
SIG
AUX POWER WARNING
HI
LO
MANUAL DIM OUT
TAP
LAMP TEST IN
P/O PILOT ENG INST DIM/TEST PANEL
P787
AUTO DIM IN
AUX POWER WARNING IN
MANUAL DIM IN
DC GND
LAMP TEST OUT
DIGITAL BLANKING OUT
A114
GS425
P/O PILOT MATRIX MODULE
P409
J4
LAMP TEST BUS
DIGITAL
BLANKING BUS
P467
J5
TB1-50
A326
SHEET 4
SHEET 2
SHEET 1
P/O FUEL SIGNAL CONDITIONER (NOTE 1)
P937
FUEL QTY TANKS IN
FWD
AFT
SHIELD
J915-B2
J915-A17
J915-B4
J915-A16
FUEL QUANTITY INDICATION/TRANSFER
FUEL SYSTEM
P937 SP1
COM
FUEL QTY TANKS OUT
A308
GS252
DC GND
GND
CHASSIS GND
28 VDC IN
P/O PILOT MATRIX MODULE
TB1-1
A326
J915-A12
J915-A9
P/O SIGNAL DATA CONVERTER
28 VDC OUT
DC IND SUPPLY OUT
5 VDC
-8 VDC
8 VDC
LAMP DC SUPPLY OUT
NO. 1
NO. 2
A82
CPG INSTRUMENT PANEL
P/O SELECTIVE DIGITAL DISPLAY PANEL
P75
FUEL QTY IN
M9
GS371
P1093
P/O CPG ENG INST DIMMER POWER SUPPLY
A518
P/O PILOT FUEL INDICATOR
P253
LAMP TEST IN
DIGITAL BLANKING IN
FUEL QTY
AFT TANK IN
FWD TANK IN
IND DC SUPPLY IN
LAMP DC SUPPLY IN
GS427
LAMP DC SUPPLY RTN
DC GROUND
FUEL QTY OUT
M17
SHEET 6

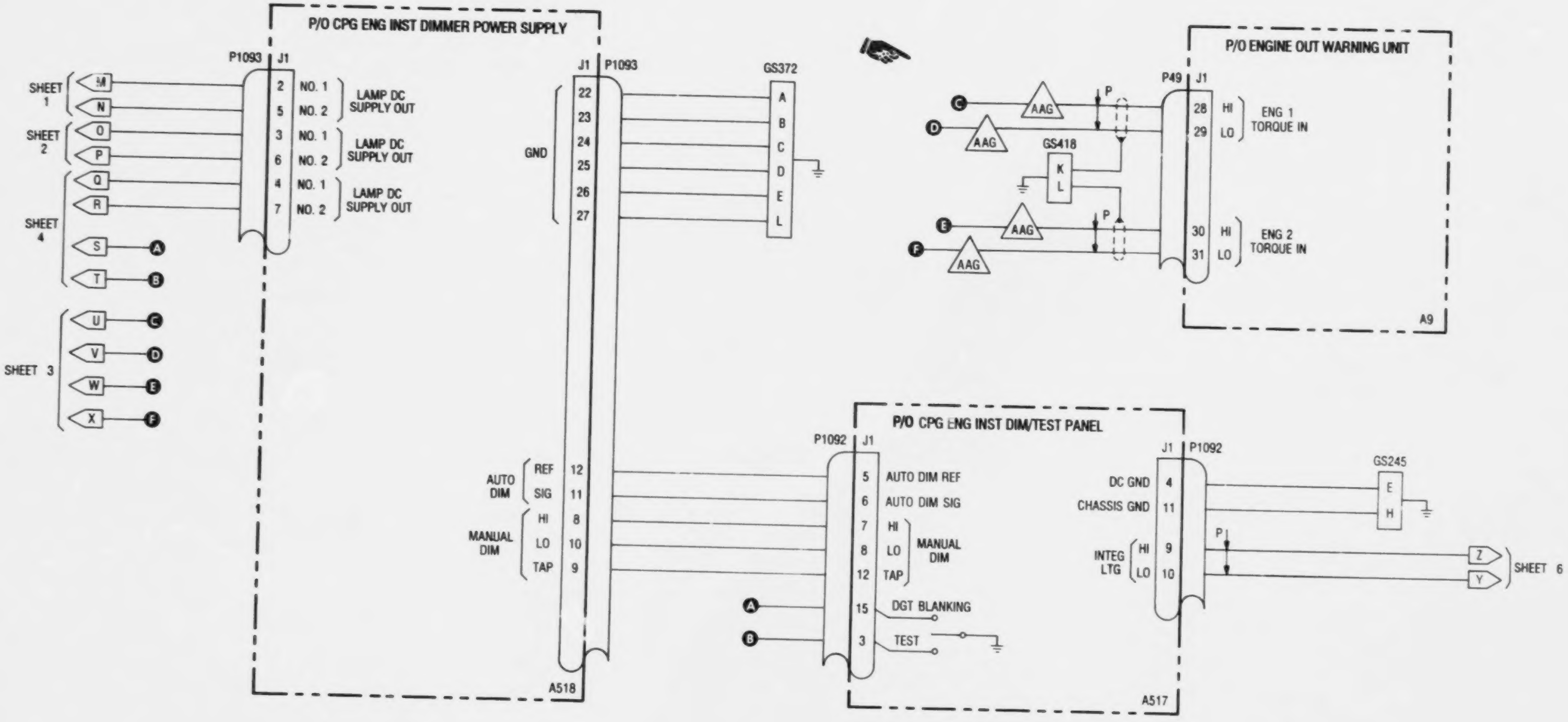
SHEET 5 OF 7 MM04/1-899-5H

8-2-4. ENGINE INSTRUMENTS - INTERCONNECTION DIAGRAM (cont)


P/O SIGNAL DATA CONVERTER
J1
P400
ENG 2 TGT IN
HI 41
LO 42
ENG 1 TGT IN
HI 44
LO 45
ENG 1 TGT AMP OUT
HI 37
LO 38
ENG 2 TGT AMP OUT
HI 39
LO 40
IND DC SUPPLY OUT
8 VDC 3
-8 VDC 11
5 VDC 17
LAMP DC SUPPLY OUT
NO. 1 29
NO. 2 35
A82
FIREWALL DISCONNECT
J452
P452
J24
P24
P42
E1J1
ENG 2 ELECTRICAL CONTROL UNIT
GS256
B C
SHLD GND
J23
P23
P41
ENG 1 ELECTRICAL CONTROL UNIT
P
P/O PILOT TGT IND
P68
J1
22 HI
23 LO
21 SHIELD
ENG 1 TGT AMP IN
18 SHIELD
19 HI
20 LO
ENG 2 TGT AMP IN
14 8 VDC
13 -8 VDC
12 5 VDC
IND DC SUPPLY IN
7 NO. 1
8 NO. 2
LAMP DC SUPPLY IN
9 NO. 2
10 NO. 1
LAMP DC SUPPLY RTN
11 DC GND
17 LAMP TEST IN
24 DIGITAL BLANKING IN
1 ENG 1
2 ENG 2
TGT OUT
M4
GS427
A
B
GND
GS251
L
SHEET 5
K
L
CPG INSTRUMENT PANEL
P/O SELECTABLE DIGITAL DISPLAY PANEL
J1
P75
TGT IN
ENG 1 28
ENG 2 29
M9
A151
GS418
A
SHIELD GND
SHEET 7
Z
Y
A
B
P/O PILOT MATRIX MODULE
TB1-38
J11
P479
P473
J6
ELECTRICAL SYSTEM
PILOT EDGE - LIGHT
P109-H
P109-L
B19
B20
P465
J12
CPG EDGE - LIGHT
P110-A
P110-C
B13
B14
(HI)
(LO)
CH 2, NO. 3 0-5 VDC
B1
B2
B3
B4
B5
B6
B7
B8
CPG INSTRUMENT PANEL
P/O SELECTABLE DIGITAL DISPLAY PANEL
0-5 VDC IN
LO 16
HI 15
M9
P/O TORQUE INDICATOR
P74
M8
P/O ENG - RTR INDICATOR
P73
M7
A151
A13
A12
A11
A10
A9
A8
A6
A7
TB1-40
CH 1, NO. 1 0-5 VDC (LO)
TB1-41
CH 1, NO. 1 0-5 VDC (HI)
TB1-36
CH 2, NO. 1 0-5 VDC (LO)
B16
B15
B14
B13
P487
J9
PILOT EDGE - LIGHT
P109-J
P109-F
B9
B10
TB1-35
CH 2, NO. 1 0-5 VDC (HI)
B12
B11
A326
PILOT INSTRUMENT PANEL
P65
P/O ENG - RTR INDICATOR
0-5 VDC IN
M1
P66
P/O TORQUE INDICATOR
M2
P67
P/O N$_G$ INDICATOR
M3
P68
P/O TGT INDICATOR
M4
P787
P/O ENG INST DIM/TEST PANEL
10 LO
9 HI
A114
P70
P/O OIL PRESSURE INDICATOR
M6
P253
P/O FUEL INDICATOR
M17
A95

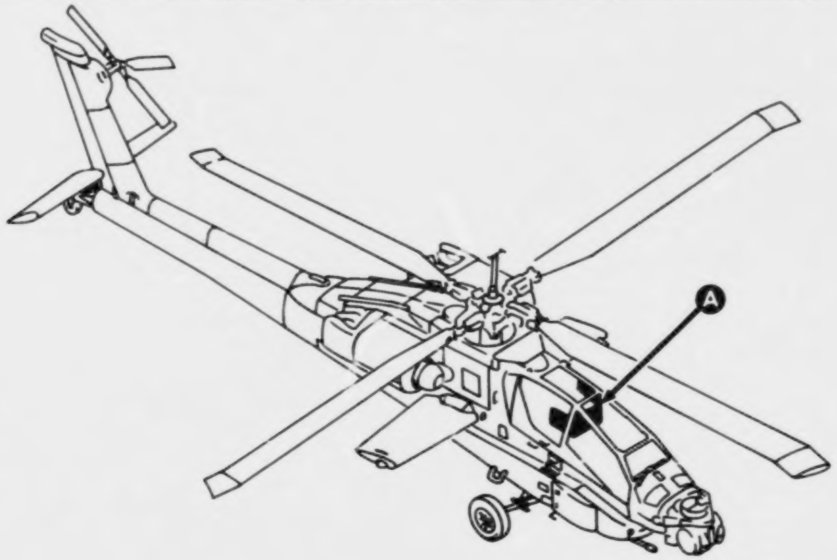
SHEET 6 OF 7 MM04/1-899-6E

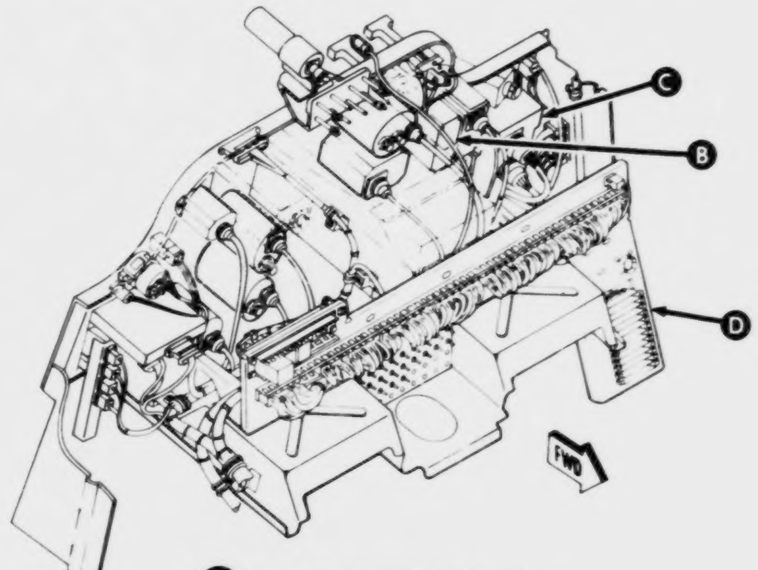
8-2-4. ENGINE INSTRUMENTS - INTERCONNECTION DIAGRAM (cont)


P/O CPG ENG INST DIMMER POWER SUPPLY
P1093
J1
SHEET 1
M
N
SHEET 2
O
P
Q
R
SHEET 4
S
T
SHEET 3
U
V
W
X
A
B
C
D
E
F
2 NO. 1
5 NO. 2
LAMP DC SUPPLY OUT
3 NO. 1
6 NO. 2
LAMP DC SUPPLY OUT
4 NO. 1
7 NO. 2
LAMP DC SUPPLY OUT
J1
P1093
GND
22
23
24
25
26
27
GS372
A
B
C
D
E
L
AUTO DIM
REF 12
SIG 11
MANUAL DIM
HI 8
LO 10
TAP 9
A518
P/O ENGINE OUT WARNING UNIT
P49
J1
AAG
P
GS418
K
L
28 HI
29 LO
ENG 1 TORQUE IN
30 HI
31 LO
ENG 2 TORQUE IN
A9
P/O CPG ENG INST DIM/TEST PANEL
P1092
J1
5 AUTO DIM REF
6 AUTO DIM SIG
7 HI
8 LO
12 TAP
MANUAL DIM
15 DGT BLANKING
3 TEST
J1
P1092
DC GND 4
CHASSIS GND 11
INTEG LTG
HI 9
LO 10
GS245
E
H
Z
Y
SHEET 6
A517

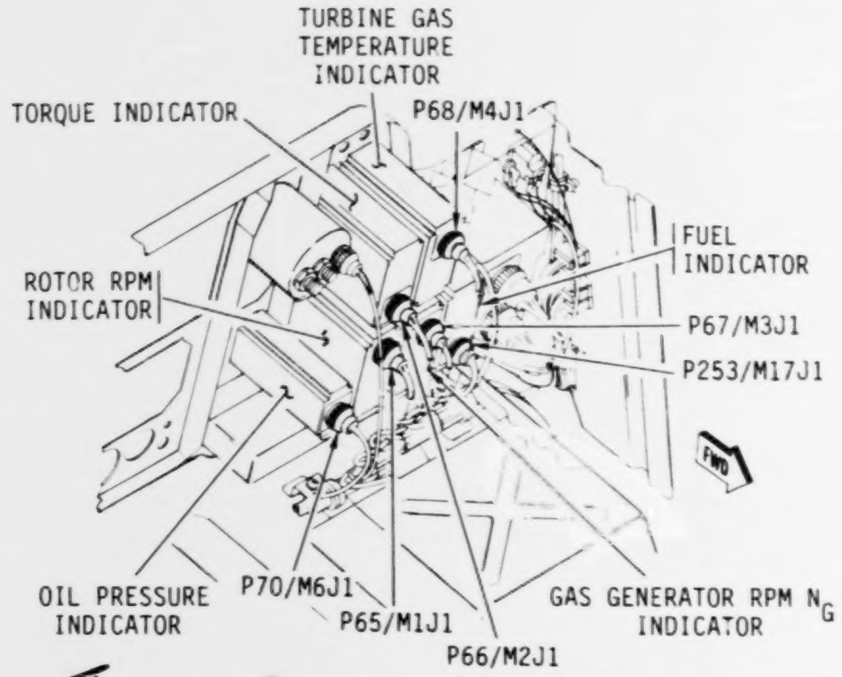
SHEET 7 OF 7 MM04/1-899-7J

8-2-5. ENGINE INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION



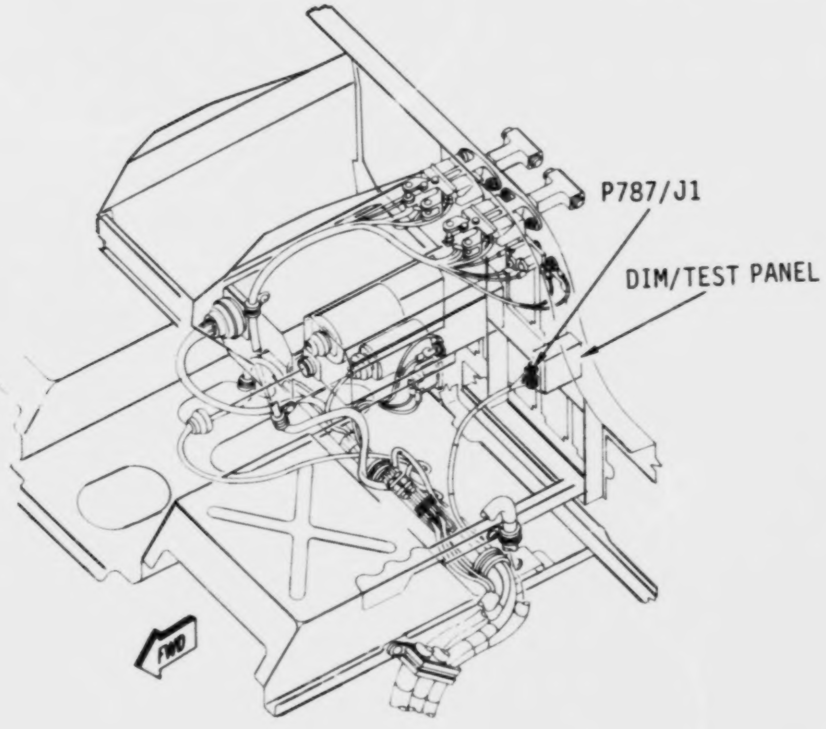


Ⓐ PILOT INSTRUMENT PANEL


TURBINE GAS TEMPERATURE INDICATOR
TORQUE INDICATOR
P68/M4J1
FUEL INDICATOR
ROTOR RPM INDICATOR
P67/M3J1
P253/M17J1
FWD
OIL PRESSURE INDICATOR
P70/M6J1
P65/M1J1
P66/M2J1
GAS GENERATOR RPM N_G INDICATOR

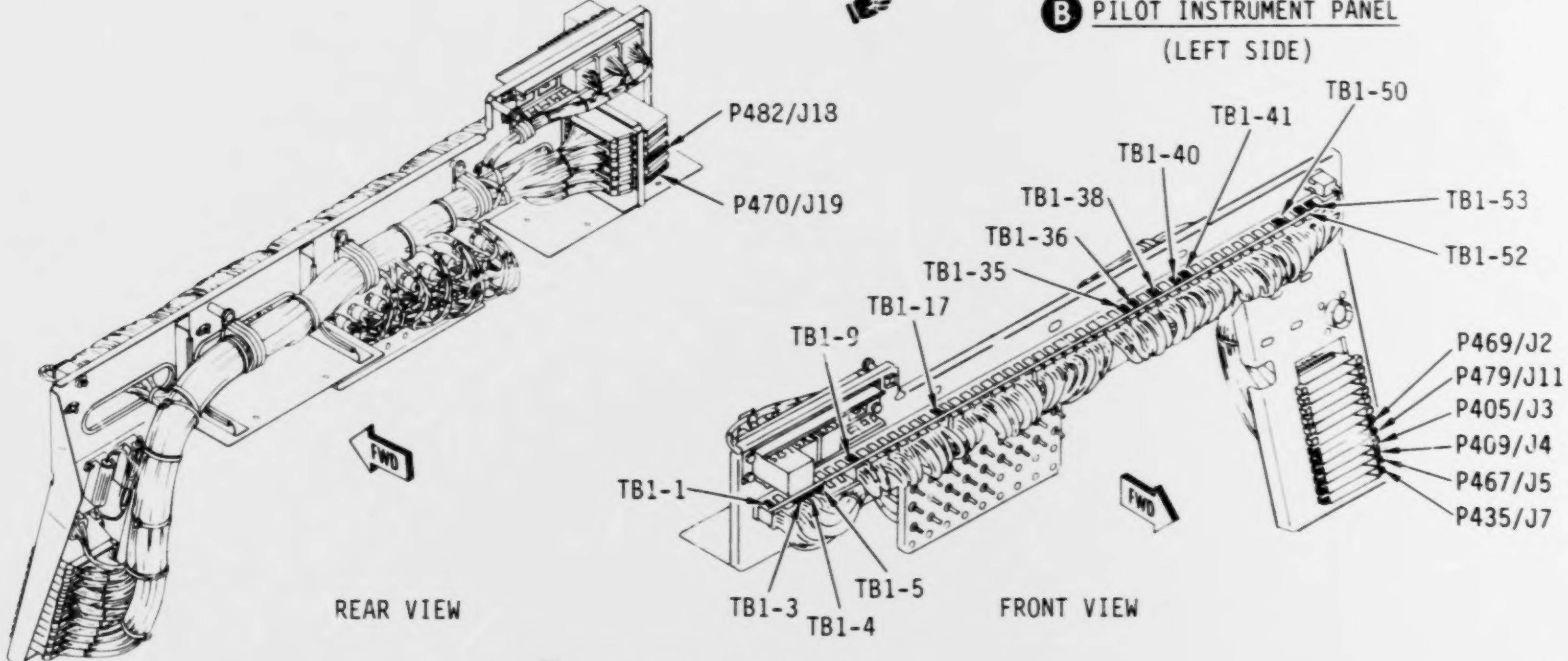
Ⓑ PILOT INSTRUMENT PANEL

(LEFT SIDE)


P787/J1
DIM/TEST PANEL
FWD

Ⓒ PILOT INSTRUMENT PANEL

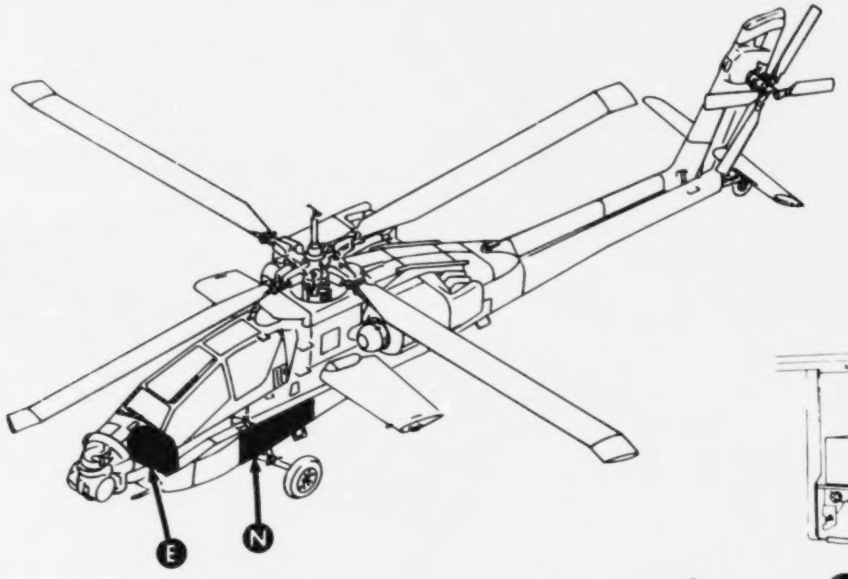
(LEFT SIDE)

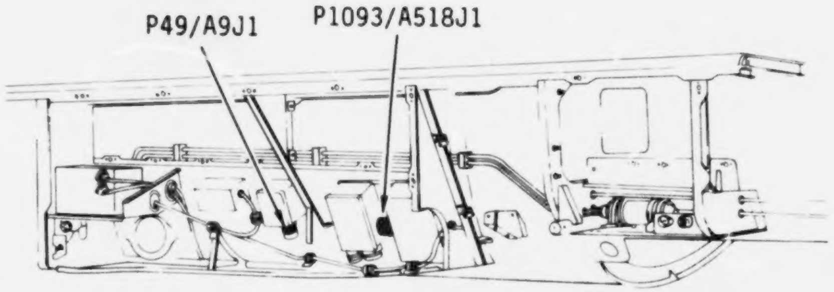

P482/J18
P470/J19
FWD
REAR VIEW
TB1-50
TB1-41
TB1-40
TB1-38
TB1-36
TB1-35
TB1-17
TB1-9
TB1-53
TB1-52
P469/J2
P479/J11
P405/J3
P409/J4
P467/J5
P435/J7
TB1-1
TB1-3
TB1-4
TB1-5
FWD
FRONT VIEW

Ⓓ PILOT MATRIX MODULE

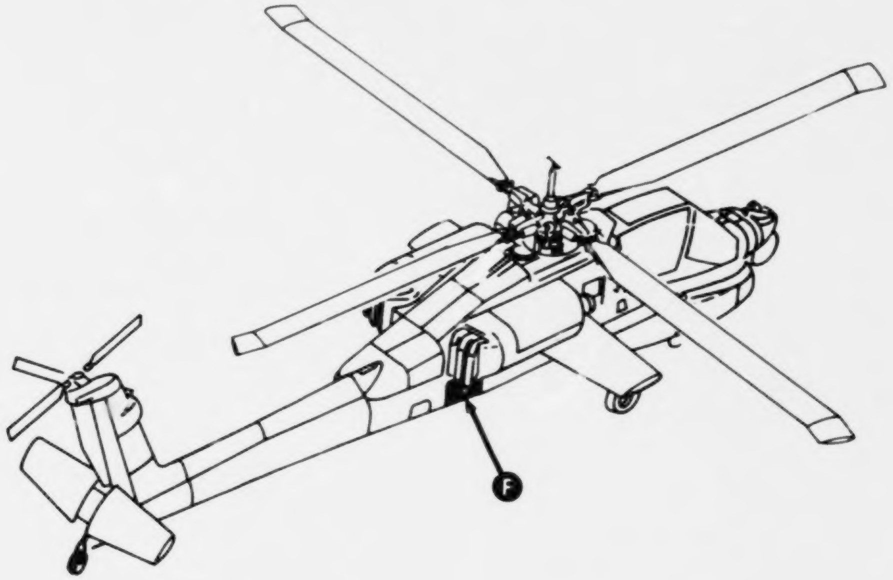
MM04/1-914-1B

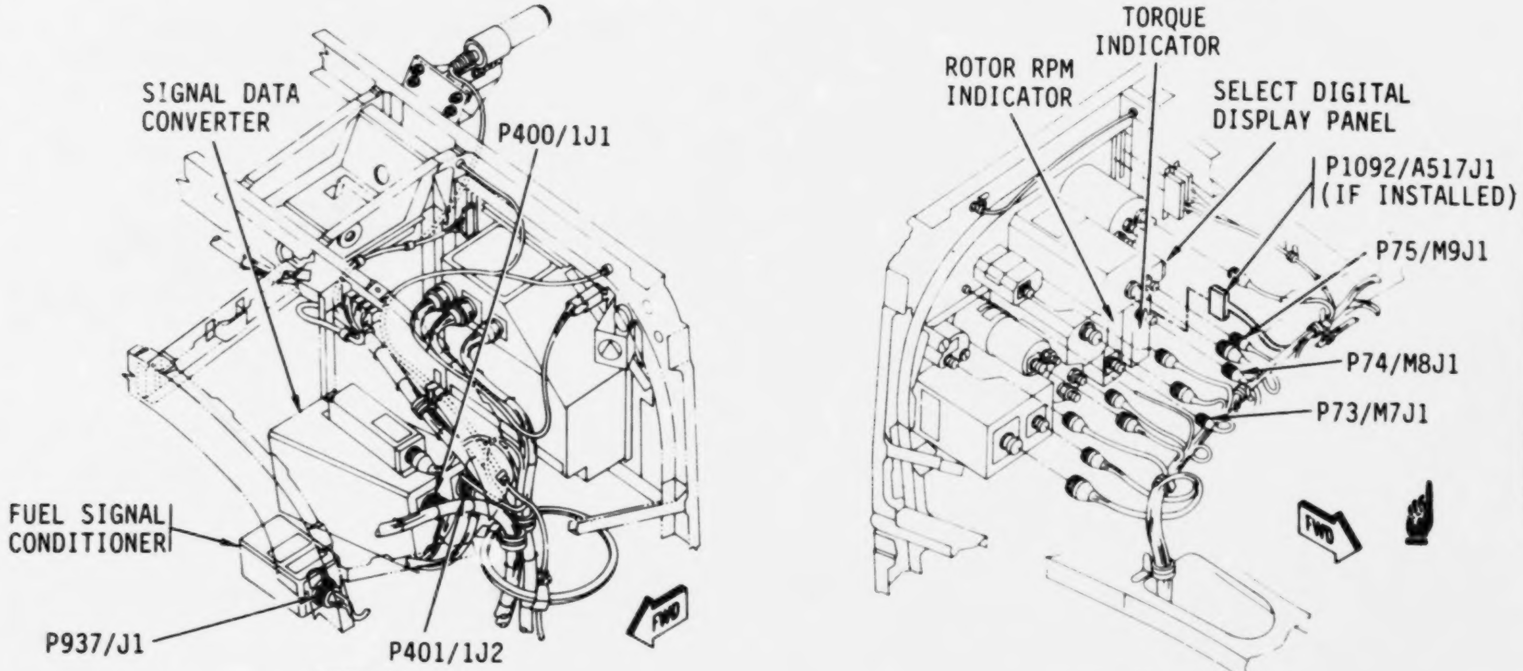
8-2-5. ENGINE INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)




P49/A9J1
P1093/A518J1

N VIEW LOOKING INBOARD AND FORWARD - LEFT SIDE
(HELICOPTERS WITH CPG DIM/TEST PANEL INSTALLED)

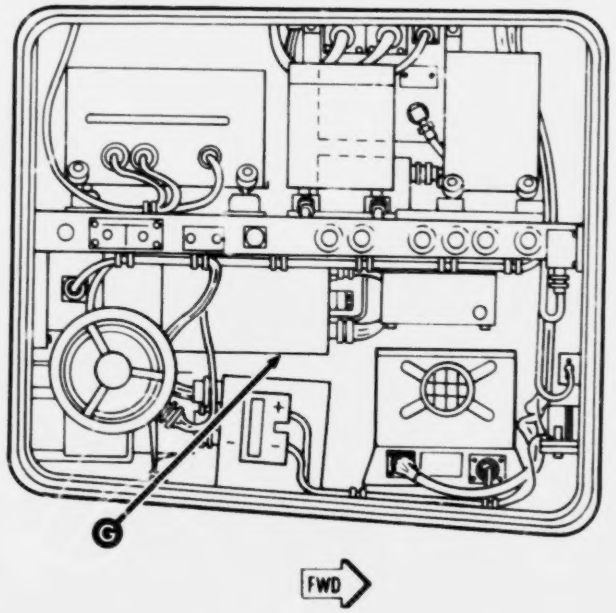



SIGNAL DATA CONVERTER
P400/1J1
FUEL SIGNAL CONDITIONER
P937/J1
P401/1J2
FWD
ROTOR RPM INDICATOR
TORQUE INDICATOR
SELECT DIGITAL DISPLAY PANEL
P1092/A517J1 (IF INSTALLED)
P75/M9J1
P74/M8J1
P73/M7J1
FWD

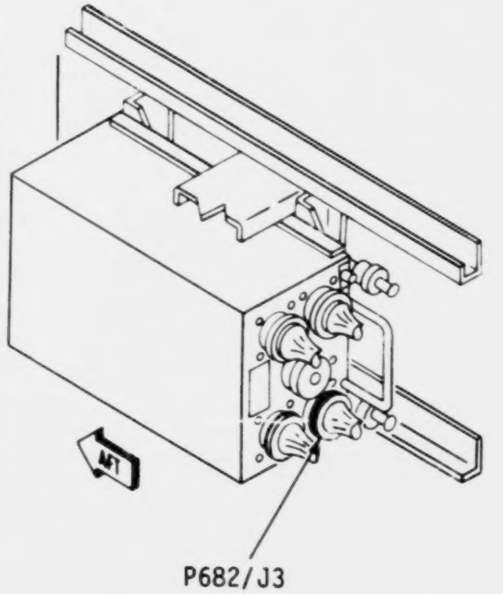
LEFT SIDE

RIGHT SIDE

E CPG INSTRUMENT PANEL



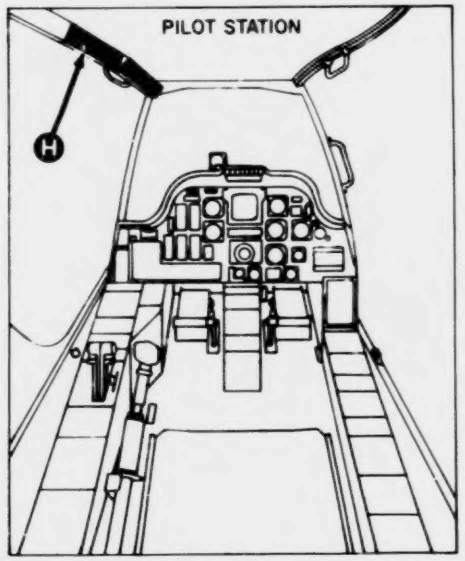
F AFT AVIONICS BAY

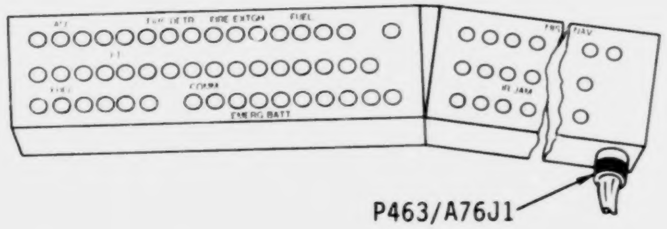


G DASEC-AFT AVIONICS BAY

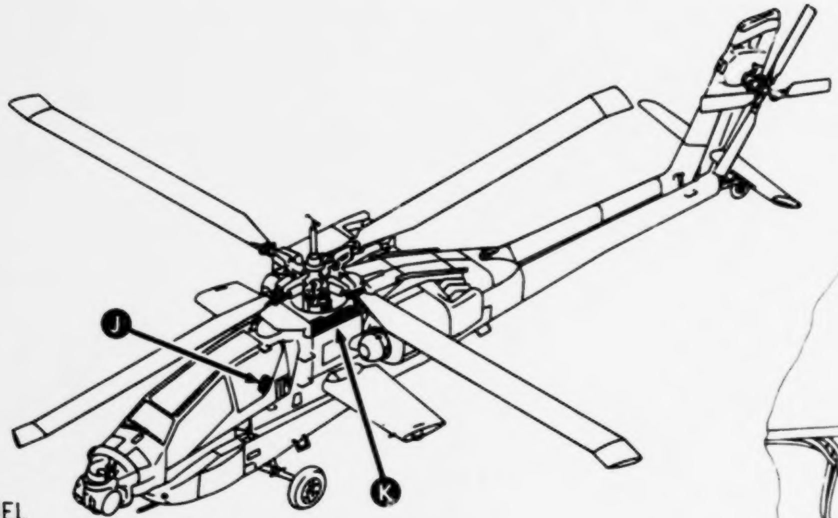
MM04/1-914-2G

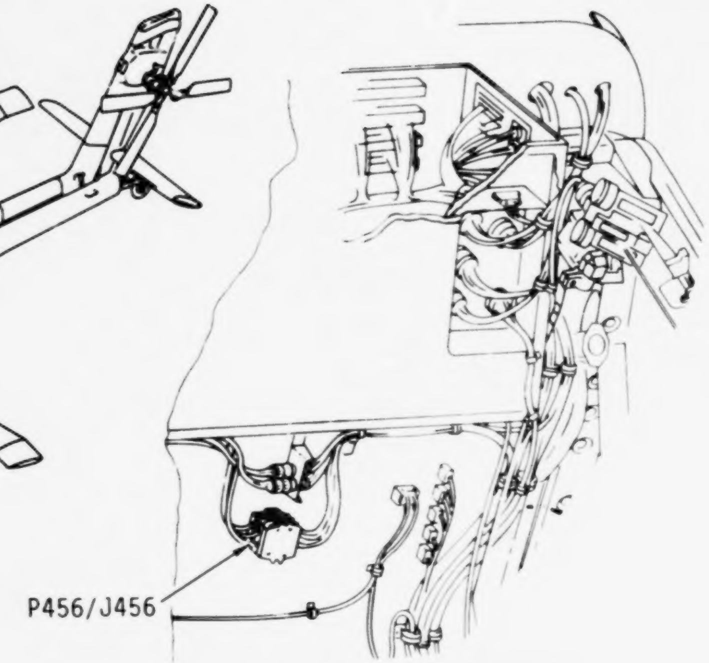
8-2-5. ENGINE INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


PILOT STATION
H

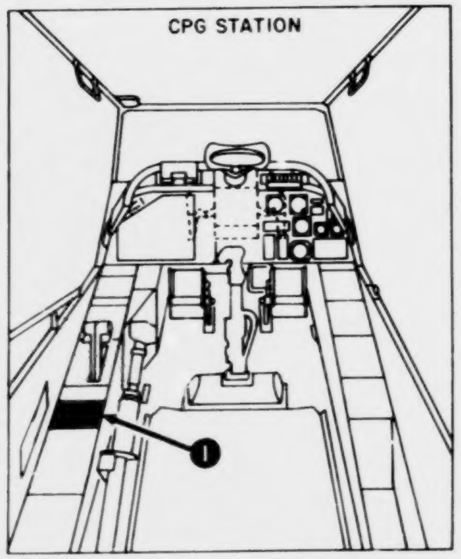

FIRE EXTGH
FUEL
EMERG BATT
P463/A76J1

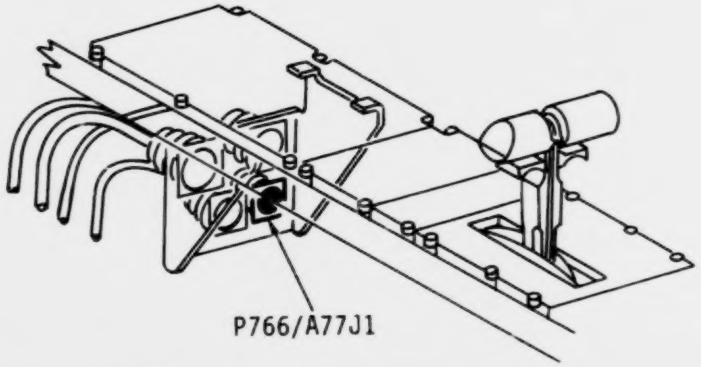
Ⓗ PILOT CENTER AND FORWARD CICUIT BREAKER PANEL



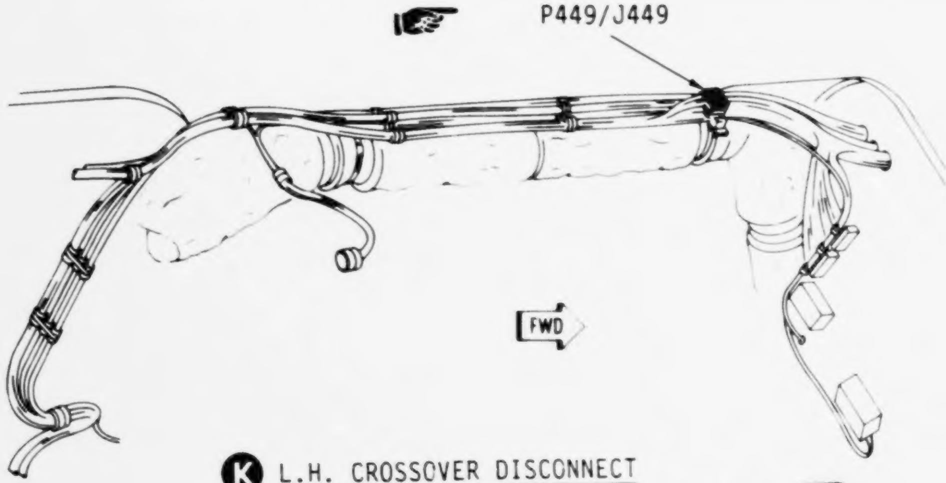


Ⓙ AFT CROSSOVER DISCONNECT
(PILOT STATION AFT BULKHEAD)


CPG STATION
I



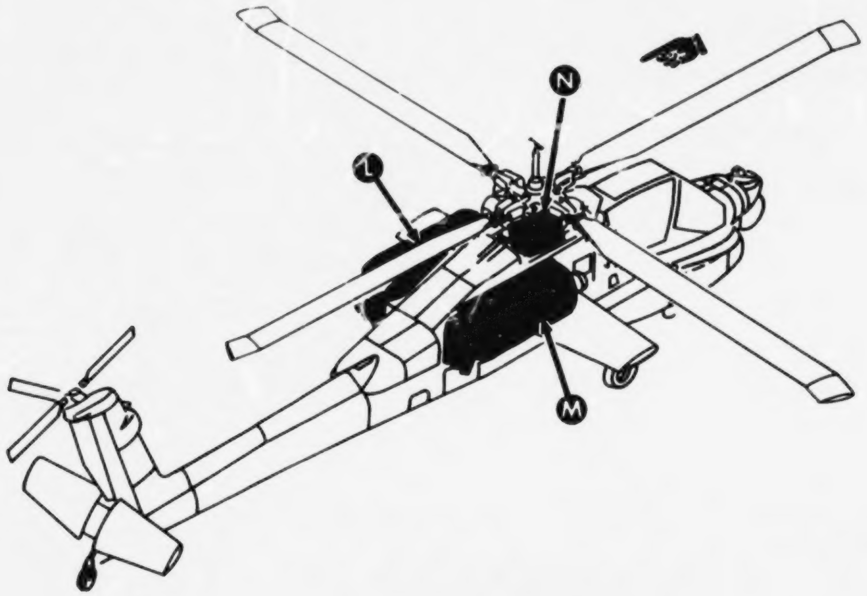
Ⓘ CPG CIRCUIT BREAKER PANEL

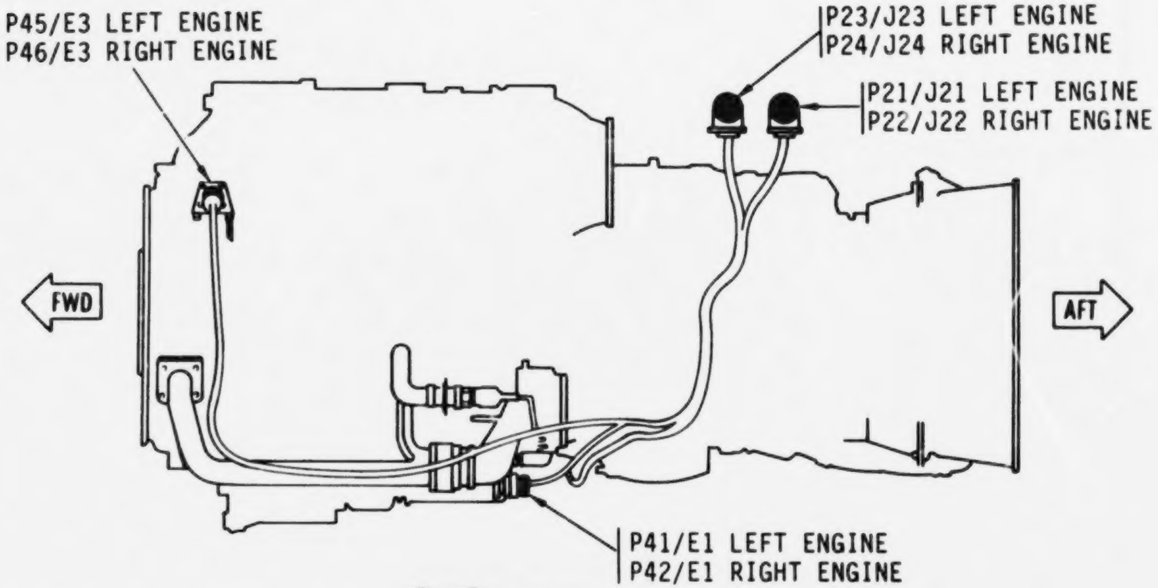

P449/J449
FWD

Ⓚ L.H. CROSSOVER DISCONNECT
(AFT DECK THROUGH FAIRING T205L)

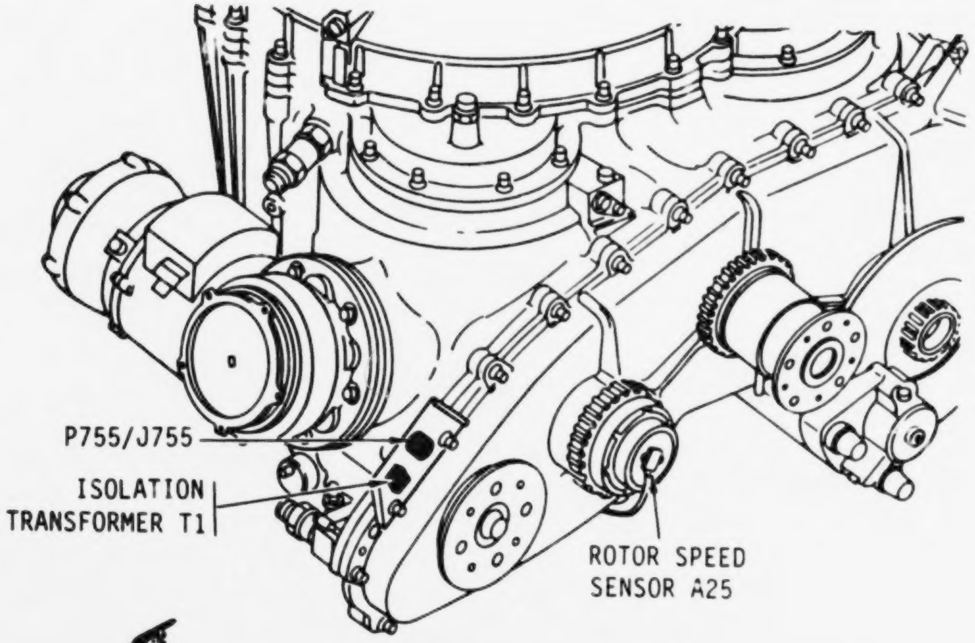
MM04/1-914-3A

8-2-5. ENGINE INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)




P45/E3 LEFT ENGINE
P46/E3 RIGHT ENGINE
P23/J23 LEFT ENGINE
P24/J24 RIGHT ENGINE
P21/J21 LEFT ENGINE
P22/J22 RIGHT ENGINE
FWD
AFT
P41/E1 LEFT ENGINE
P42/E1 RIGHT ENGINE

Ⓛ Ⓜ ENGINE LEFT SIDE SHOWN


P755/J755
ISOLATION TRANSFORMER T1
ROTOR SPEED SENSOR A25

Ⓝ MAIN TRANSMISSION
(VIEW LOOKING AFT THROUGH CATWALK AREA)

MM04/1-914-4A

8-2-6. PILOT ENG INST CIRCUIT BREAKER - DOES NOT STAY CLOSED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

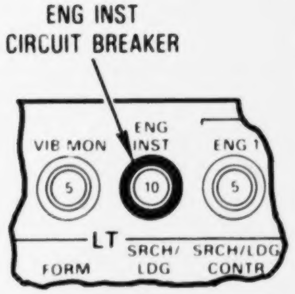
68F10 Aircraft Electrician
One person to assist

References:

TM 55-1520-238-23

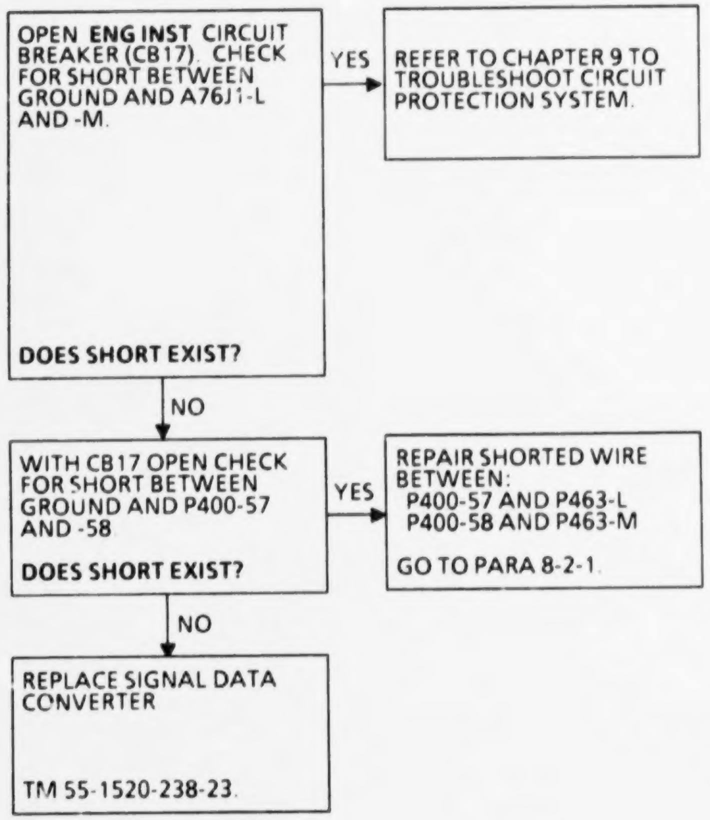
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


ENG INST
CIRCUIT BREAKER
VIB MON
ENG
INST
ENG 1
5
10
5
LT
FORM
SRCH/
LDG
SRCH/LDG
CONTR

PILOT CENTER CIRCUIT BREAKER PANEL

MM04/1-974


OPEN **ENG INST** CIRCUIT BREAKER (CB17). CHECK FOR SHORT BETWEEN GROUND AND A76J1-L AND -M.

DOES SHORT EXIST?

YES: REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

NO: WITH CB17 OPEN CHECK FOR SHORT BETWEEN GROUND AND P400-57 AND -58.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
P400-57 AND P463-L
P400-58 AND P463-M

GO TO PARA 8-2-1.

NO: REPLACE SIGNAL DATA CONVERTER.

TM 55-1520-238-23.

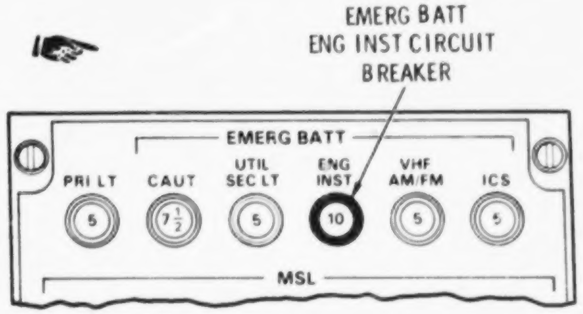
8-2-7. CPG EMERG BATT ENG INST CIRCUIT BREAKER - DOES NOT STAY CLOSED (HELICOPTERS WITHOUT CPG DIM/TEST PANEL INSTALLED)

Tools: (para 8-2-6)

Personnel Required: (para 8-2-6)

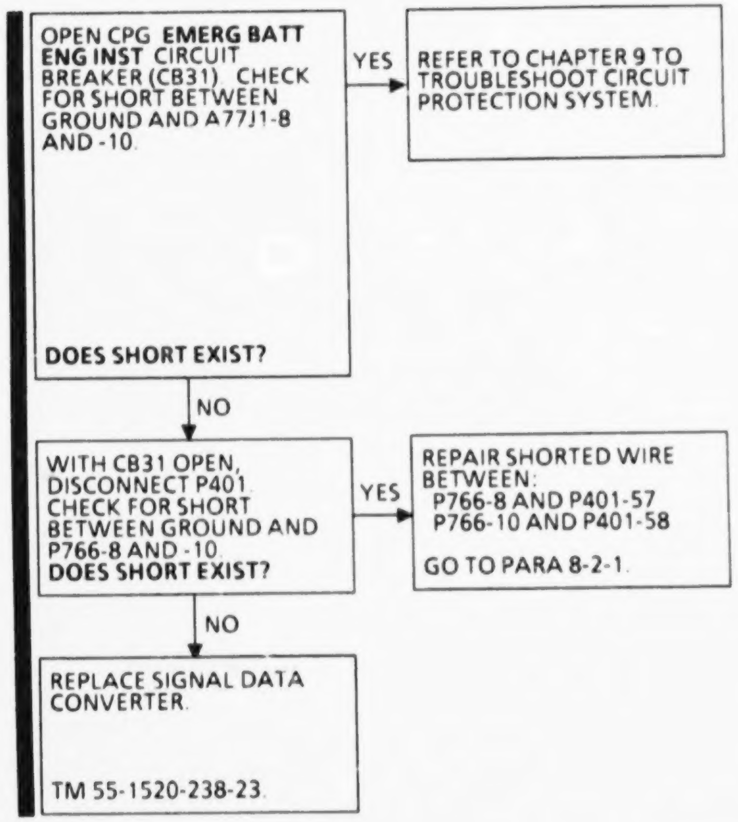
References: (para 8-2-6)

Equipment Conditions: (para 8-2-6)


EMERG BATT
ENG INST CIRCUIT
BREAKER
EMERG BATT
PRI LT
CAUT
UTIL
SEC LT
ENG
INST
VHF
AM/FM
ICS
5
7½
5
10
5
5
MSL

CPG CIRCUIT BREAKER PANEL NO. 1

MM04/1-979A


OPEN CPG **EMERG BATT ENG INST** CIRCUIT BREAKER (CB31). CHECK FOR SHORT BETWEEN GROUND AND A77J1-8 AND -10.

DOES SHORT EXIST?

YES: REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

NO: WITH CB31 OPEN, DISCONNECT P401. CHECK FOR SHORT BETWEEN GROUND AND P766-8 AND -10.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
P766-8 AND P401-57
P766-10 AND P401-58

GO TO PARA 8-2-1.

NO: REPLACE SIGNAL DATA CONVERTER.

TM 55-1520-238-23.

END OF TASK

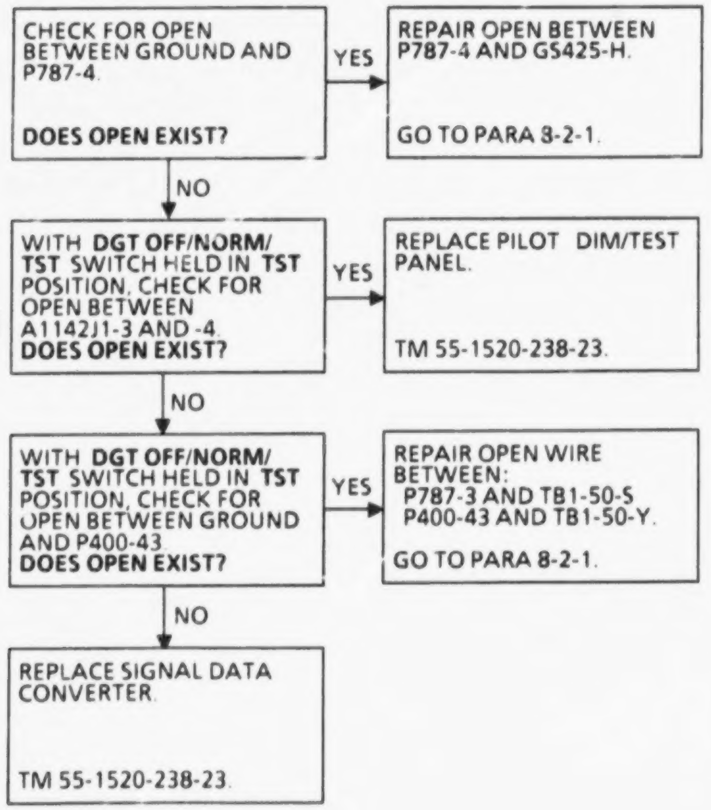
8-2-8. AUX PWR INDICATOR ON DIM/TEST PANEL - LIGHTS

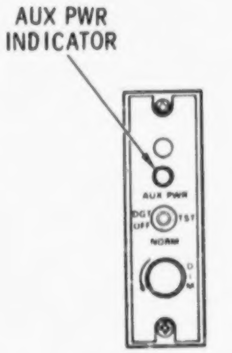
Tools: (para 8-2-6)

Personnel Required: (para 8-2-6)

References: (para 8-2-6)

Equipment Conditions: (para 8-2-6)


CHECK FOR OPEN BETWEEN GROUND AND P787-4.
DOES OPEN EXIST?
YES
REPAIR OPEN BETWEEN P787-4 AND GS425-H.
GO TO PARA 8-2-1.
NO
WITH DGT OFF/NORM/TST SWITCH HELD IN TST POSITION, CHECK FOR OPEN BETWEEN A1142J1-3 AND -4.
DOES OPEN EXIST?
YES
REPLACE PILOT DIM/TEST PANEL.
TM 55-1520-238-23.
NO
WITH DGT OFF/NORM/TST SWITCH HELD IN TST POSITION, CHECK FOR OPEN BETWEEN GROUND AND P400-43.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN:
P787-3 AND TB1-50-S
P400-43 AND TB1-50-Y.
GO TO PARA 8-2-1.
NO
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.


AUX PWR INDICATOR
AUX PWR
DGT
OFF
TST
NORM

PILOT DIM/TEST PANEL

MM04/1-975

END OF TASK

8-2-9. AUX PWR INDICATOR ON DIM/TEST PANEL - DOES NOT LIGHT

Tools: (para 8-2-6)

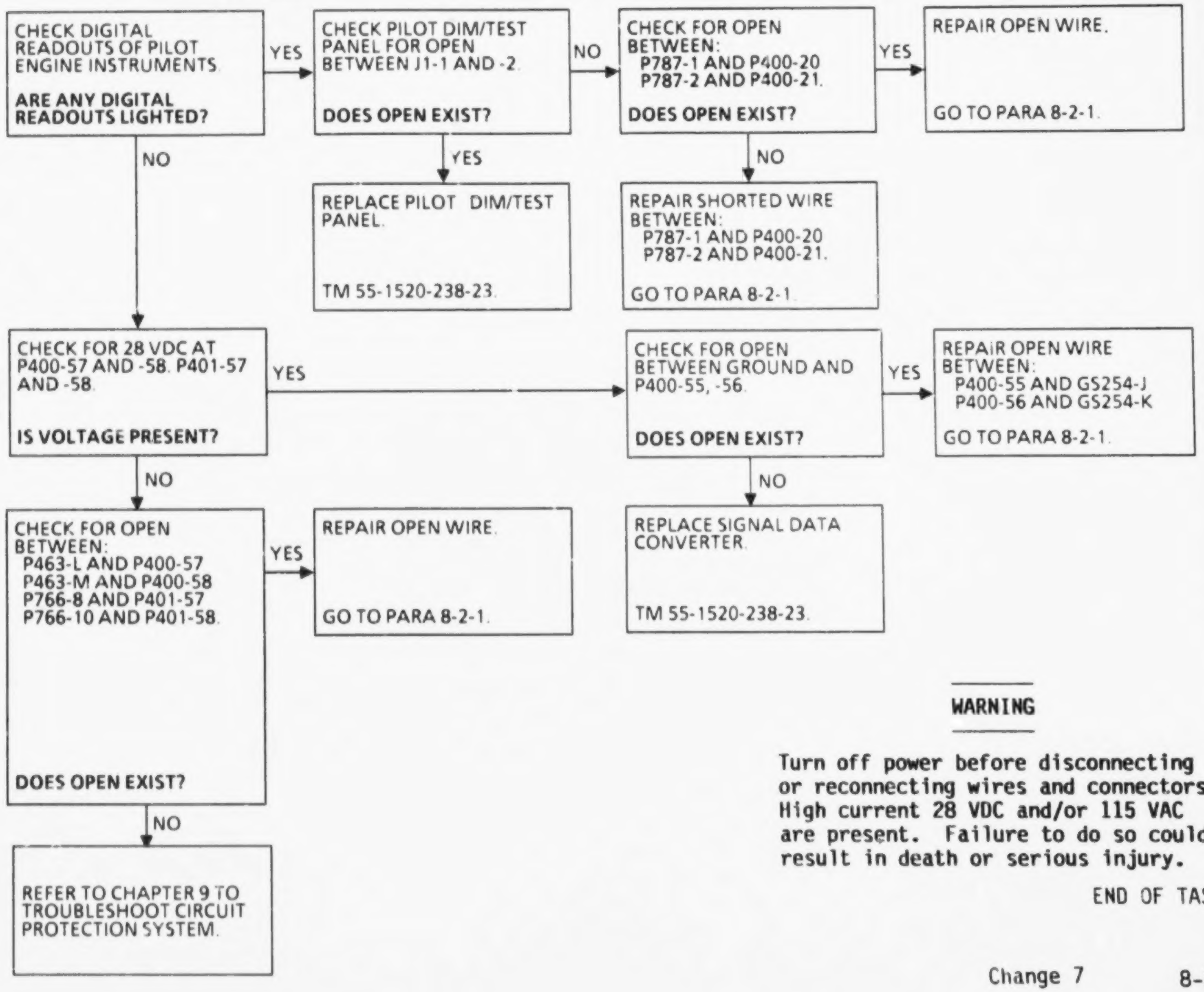
Personnel Required: (para 8-2-6)

References: (para 8-2-6)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

REFER TO VOLTAGE WARNING


CHECK DIGITAL READOUTS OF PILOT ENGINE INSTRUMENTS.
ARE ANY DIGITAL READOUTS LIGHTED?
YES
CHECK PILOT DIM/TEST PANEL FOR OPEN BETWEEN J1-1 AND -2.
DOES OPEN EXIST?
NO
CHECK FOR OPEN BETWEEN:
P787-1 AND P400-20
P787-2 AND P400-21.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
YES
REPLACE PILOT DIM/TEST PANEL.
TM 55-1520-238-23.
NO
REPAIR SHORTED WIRE BETWEEN:
P787-1 AND P400-20
P787-2 AND P400-21.
GO TO PARA 8-2-1.
NO
CHECK FOR 28 VDC AT P400-57 AND -58, P401-57 AND -58.
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN GROUND AND P400-55, -56.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN:
P400-55 AND GS254-J
P400-56 AND GS254-K
GO TO PARA 8-2-1.
NO
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN:
P463-L AND P400-57
P463-M AND P400-58
P766-8 AND P401-57
P766-10 AND P401-58.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

END OF TASK

8-2-10. CPG EMERG BATT ENG INST CIRCUIT BREAKER - DOES NOT STAY CLOSED (HELICOPTERS WITH CPG DIM/TEST PANEL INSTALLED)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	5625-00-999-6282

Personnel Required:

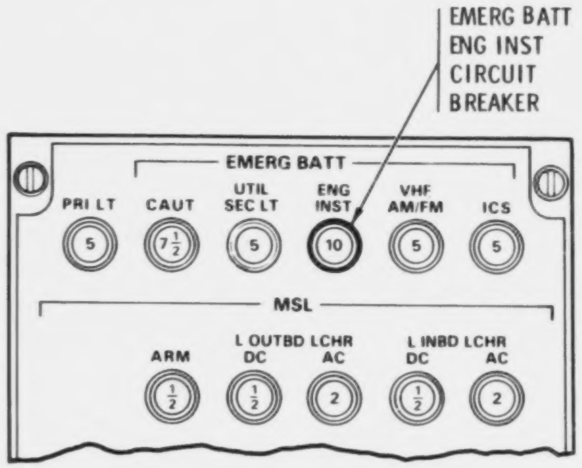
68F10 Aircraft Electrician

References:

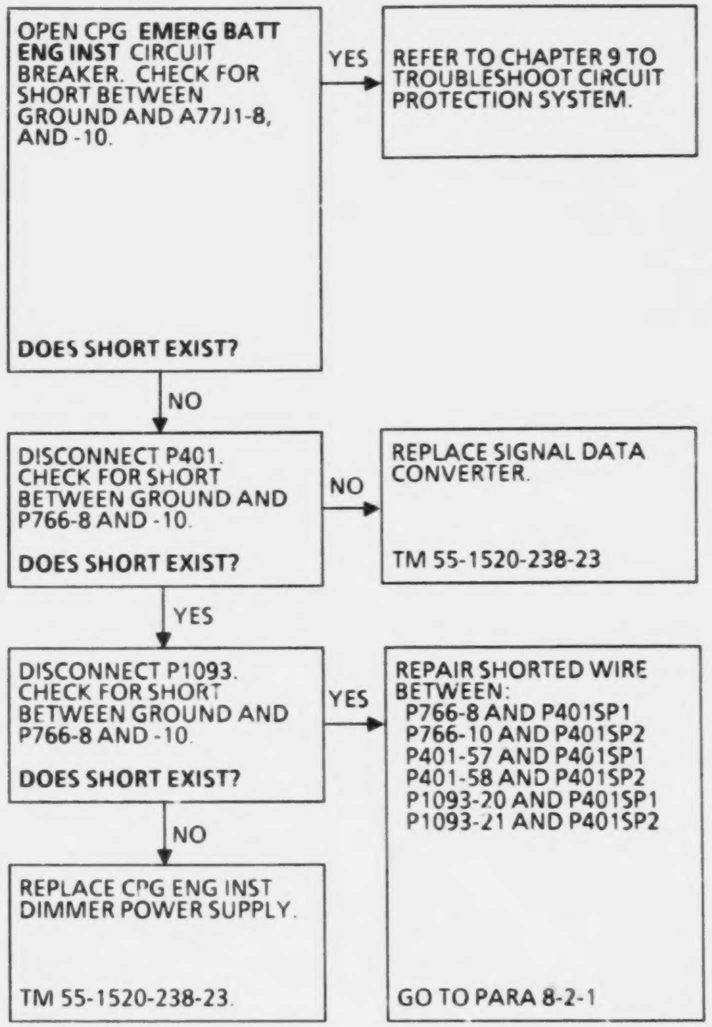
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


EMERG BATT
ENG INST
CIRCUIT
BREAKER
EMERG BATT
PRI LT
CAUT
UTIL SEC LT
ENG INST
VHF AM/FM
ICS
5
$7\frac{1}{2}$
5
10
5
5
MSL
ARM
L OUTBD LCHR DC
AC
L INBD LCHR DC
AC
$\frac{1}{2}$
$\frac{1}{2}$
2
$\frac{1}{2}$
2

CPG CIRCUIT BREAKER PANEL NO. 1



OPEN CPG **EMERG BATT ENG INST** CIRCUIT BREAKER. CHECK FOR SHORT BETWEEN GROUND AND A77J1-8, AND -10.

DOES SHORT EXIST?

YES → REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

NO ↓

DISCONNECT P401. CHECK FOR SHORT BETWEEN GROUND AND P766-8 AND -10.

DOES SHORT EXIST?

NO → REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23

YES ↓

DISCONNECT P1093. CHECK FOR SHORT BETWEEN GROUND AND P766-8 AND -10.

DOES SHORT EXIST?

YES → REPAIR SHORTED WIRE BETWEEN:
P766-8 AND P401SP1
P766-10 AND P401SP2
P401-57 AND P401SP1
P401-58 AND P401SP2
P1093-20 AND P401SP1
P1093-21 AND P401SP2
GO TO PARA 8-2-1

NO ↓

REPLACE CPG ENG INST DIMMER POWER SUPPLY. TM 55-1520-238-23.

MM04/1-1435

END OF TASK

8-2-11. ALL PILOT ENGINE INSTRUMENTS - DO NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8s OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED.

Tools: (para 8-2-10)

Personnel Required: (para 8-2-10)

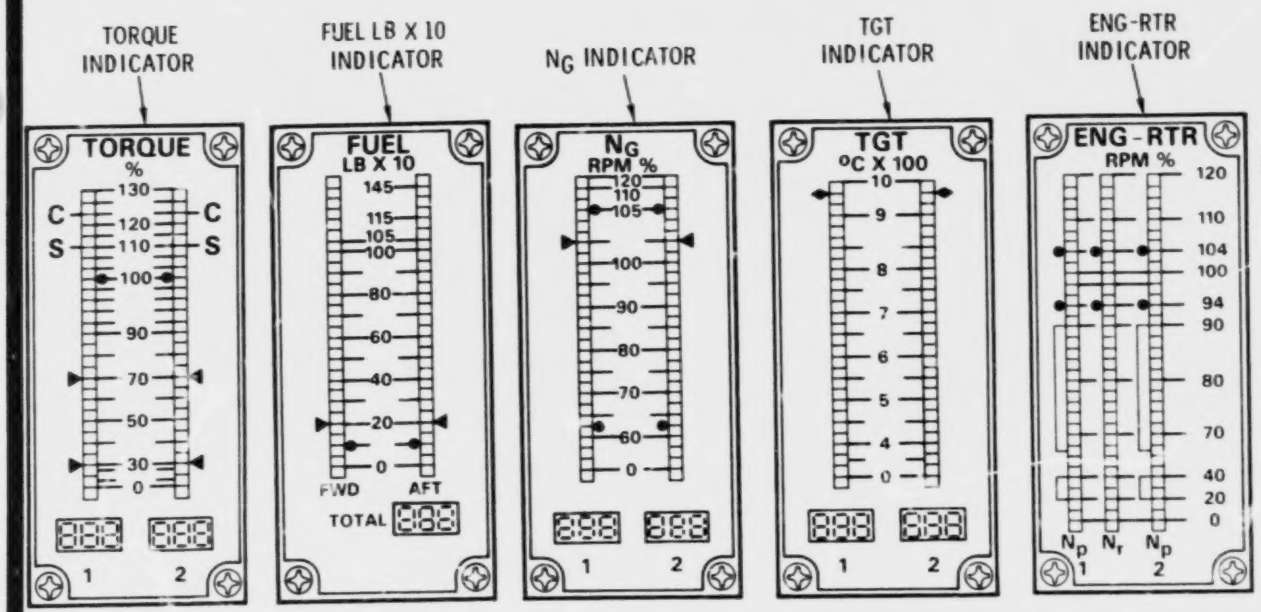
References: (para 8-2-10)

Equipment Conditions:

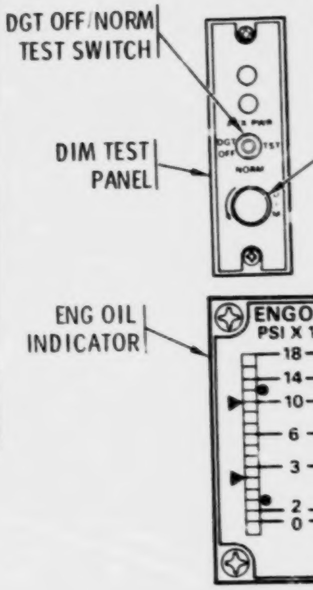
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

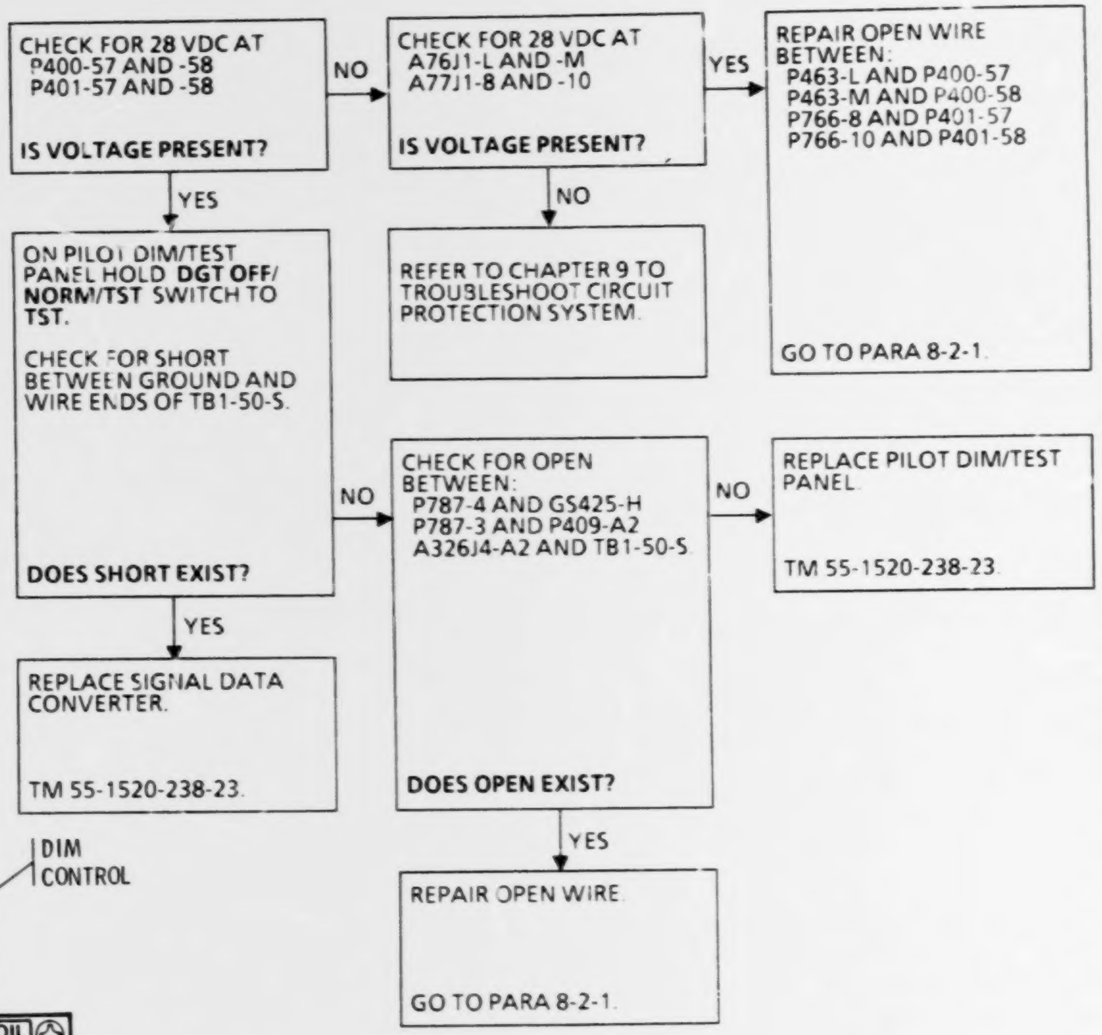
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


TORQUE INDICATOR
FUEL LB X 10 INDICATOR
N$_G$ INDICATOR
TGT INDICATOR
ENG-RTR INDICATOR
TORQUE %
C S
130 120 110 100 90 70 50 30 0
1 2
FUEL LB X 10
145 115 105 100 80 60 40 20 0
FWD AFT
TOTAL
N$_G$ RPM %
120 110 105 100 90 80 70 60 0
1 2
TGT °C X 100
10 9 8 7 6 5 4 0
1 2
ENG - RTR RPM %
120 110 104 100 94 90 80 70 40 20 0
N$_P$ 1 N$_r$ N$_P$ 2

PILOT ENGINE INSTRUMENTS


DGT OFF/NORM TEST SWITCH
DIM TEST PANEL
DIM CONTROL
ENG OIL INDICATOR
ENG OIL PSI X 10
18 14 10 6 3 2 0


CHECK FOR 28 VDC AT P400-57 AND -58 P401-57 AND -58

IS VOLTAGE PRESENT?

NO → CHECK FOR 28 VDC AT A76J1-L AND -M A77J1-8 AND -10

IS VOLTAGE PRESENT?

YES → REPAIR OPEN WIRE BETWEEN:
P463-L AND P400-57
P463-M AND P400-58
P766-8 AND P401-57
P766-10 AND P401-58

GO TO PARA 8-2-1.

NO → REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

YES → ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH TO **TST.**

CHECK FOR SHORT BETWEEN GROUND AND WIRE ENDS OF TB1-50-S.

DOES SHORT EXIST?

YES → REPLACE SIGNAL DATA CONVERTER.

TM 55-1520-238-23.

NO → CHECK FOR OPEN BETWEEN:
P787-4 AND GS425-H
P787-3 AND P409-A2
A326J4-A2 AND TB1-50-S.

DOES OPEN EXIST?

NO → REPLACE PILOT DIM/TEST PANEL.

TM 55-1520-238-23.

YES → REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

MM04/1-1436

END OF TASK

8-2-12. PILOT TGT INDICATOR - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8s OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

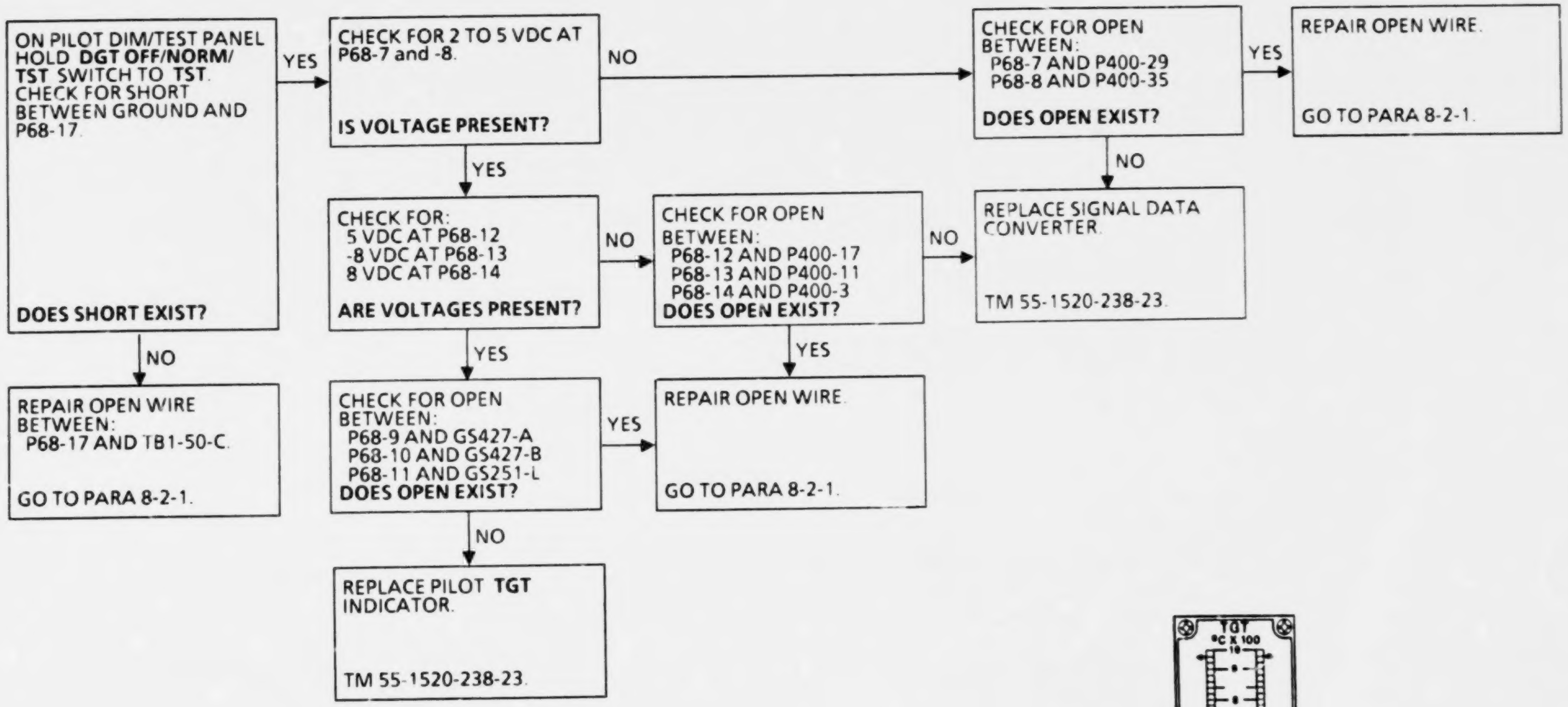
TM 55-1520-238-23

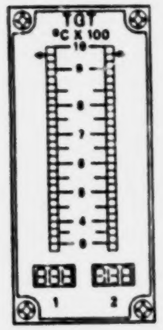
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON PILOT DIM/TEST PANEL HOLD DGT OFF/NORM/TST SWITCH TO TST. CHECK FOR SHORT BETWEEN GROUND AND P68-17.
DOES SHORT EXIST?
YES
NO
REPAIR OPEN WIRE BETWEEN: P68-17 AND TB1-50-C.
GO TO PARA 8-2-1.
CHECK FOR 2 TO 5 VDC AT P68-7 and -8.
IS VOLTAGE PRESENT?
NO
YES
CHECK FOR: 5 VDC AT P68-12 -8 VDC AT P68-13 8 VDC AT P68-14
ARE VOLTAGES PRESENT?
NO
YES
CHECK FOR OPEN BETWEEN: P68-9 AND GS427-A P68-10 AND GS427-B P68-11 AND GS251-L
DOES OPEN EXIST?
YES
NO
REPLACE PILOT TGT INDICATOR.
TM 55-1520-238-23.
CHECK FOR OPEN BETWEEN: P68-12 AND P400-17 P68-13 AND P400-11 P68-14 AND P400-3
DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
CHECK FOR OPEN BETWEEN: P68-7 AND P400-29 P68-8 AND P400-35
DOES OPEN EXIST?
YES
NO
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.


TGT
°C X 100
10
1
2

PILOT TGT INDICATOR

MM04/1-976

END OF TASK

8-2-13. PILOT TORQUE INDICATOR - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8'S OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED

Tools: (para 8-2-12)

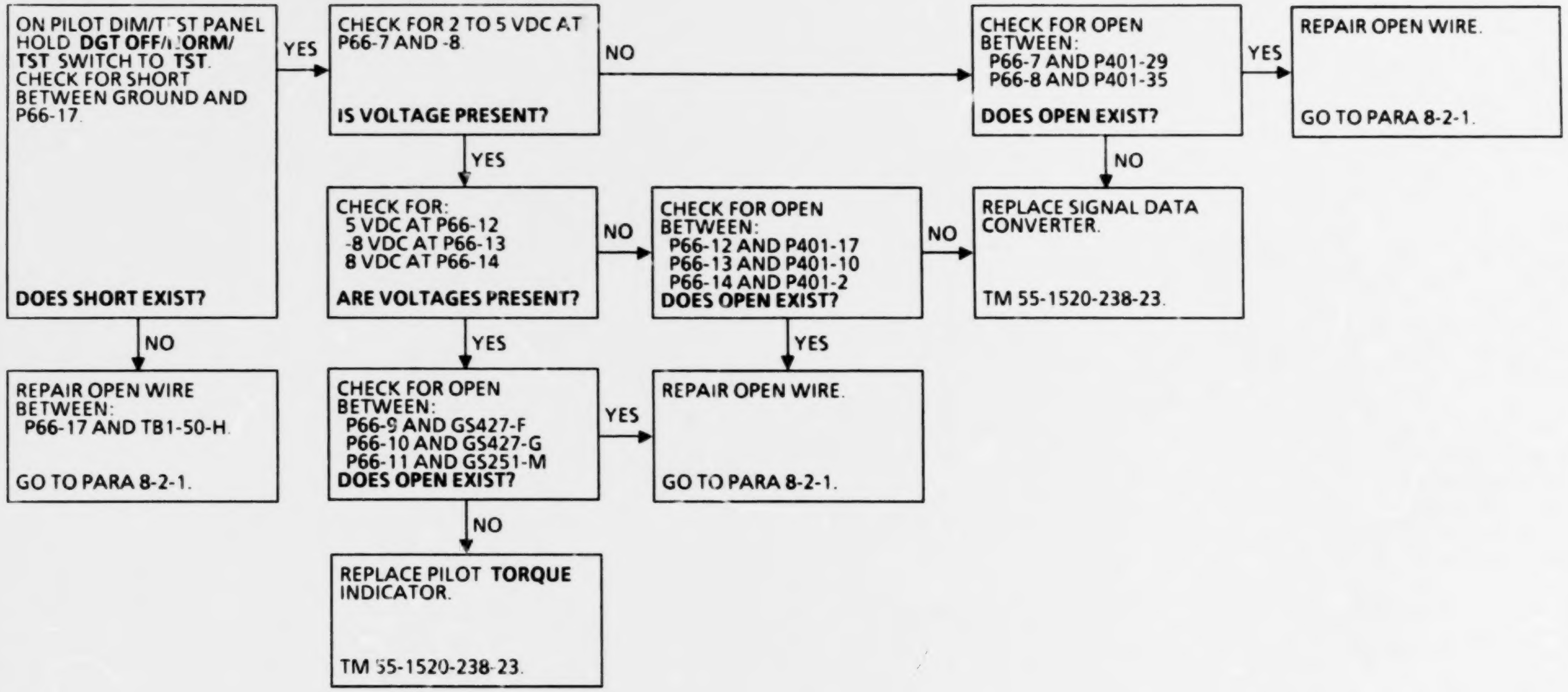
Personnel Required: (para 8-2-12)

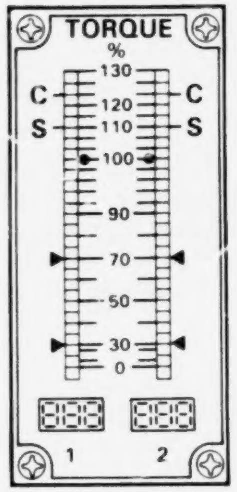
References: (para 8-2-12)

Equipment Conditions: (para 8-2-12)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH TO **TST**. CHECK FOR SHORT BETWEEN GROUND AND P66-17.
DOES SHORT EXIST?
YES
NO
REPAIR OPEN WIRE BETWEEN: P66-17 AND TB1-50-H.
GO TO PARA 8-2-1.
CHECK FOR 2 TO 5 VDC AT P66-7 AND -8.
IS VOLTAGE PRESENT?
NO
YES
CHECK FOR: 5 VDC AT P66-12 -8 VDC AT P66-13 8 VDC AT P66-14
ARE VOLTAGES PRESENT?
NO
YES
CHECK FOR OPEN BETWEEN: P66-9 AND GS427-F P66-10 AND GS427-G P66-11 AND GS251-M
DOES OPEN EXIST?
YES
NO
REPLACE PILOT **TORQUE** INDICATOR.
TM 55-1520-238-23.
CHECK FOR OPEN BETWEEN: P66-12 AND P401-17 P66-13 AND P401-10 P66-14 AND P401-2
DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
CHECK FOR OPEN BETWEEN: P66-7 AND P401-29 P66-8 AND P401-35
DOES OPEN EXIST?
YES
NO
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.


TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
C
S
1
2

PILOT TORQUE INDICATOR

MM04/1-977

END OF TASK

8-2-14. PILOT FUEL LBX10 INDICATOR - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8'S OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

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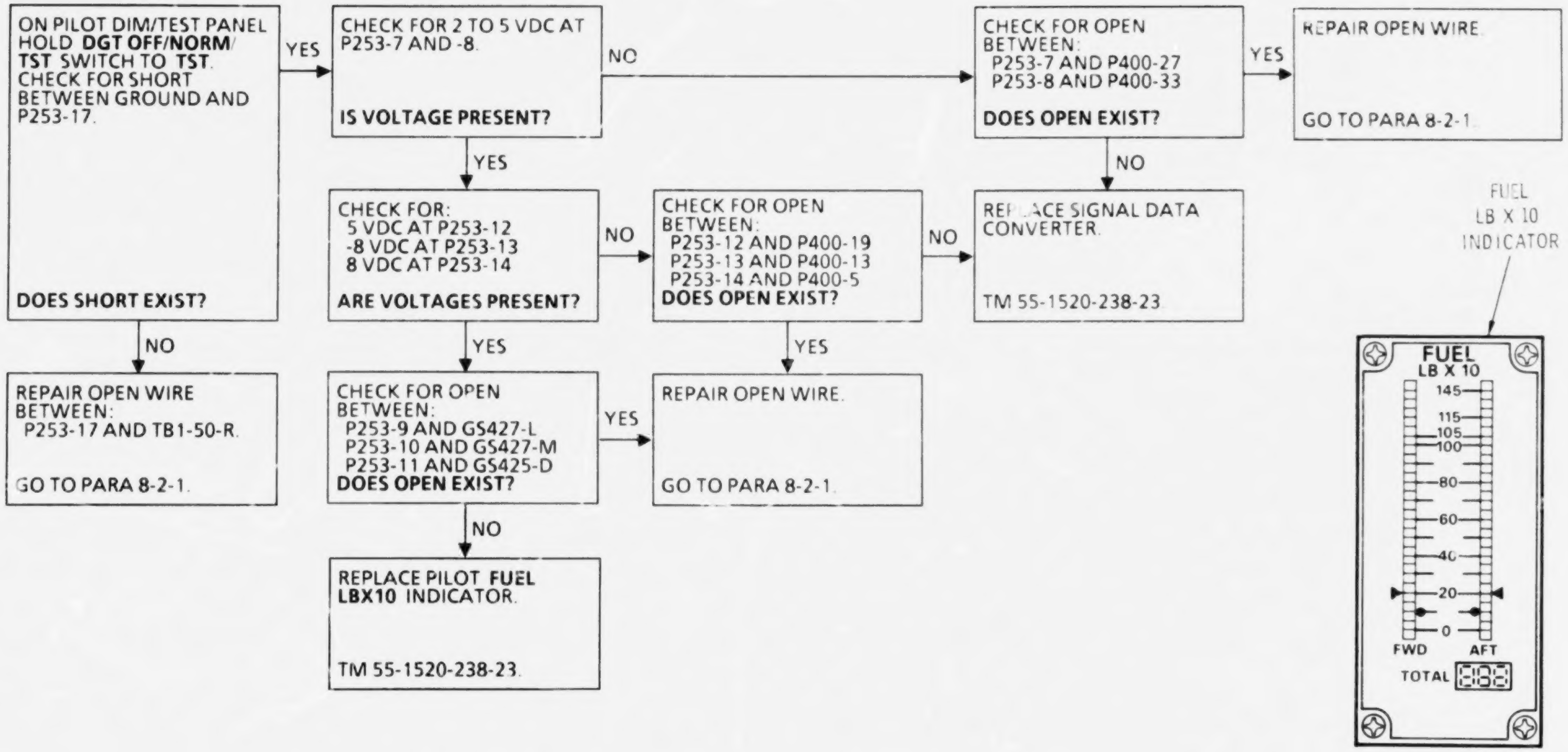
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH TO **TST**. CHECK FOR SHORT BETWEEN GROUND AND P253-17.

DOES SHORT EXIST?

REPAIR OPEN WIRE BETWEEN: P253-17 AND TB1-50-R.

GO TO PARA 8-2-1.

CHECK FOR 2 TO 5 VDC AT P253-7 AND -8.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN:
P253-7 AND P400-27
P253-8 AND P400-33

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPLACE SIGNAL DATA CONVERTER.

TM 55-1520-238-23

CHECK FOR:
5 VDC AT P253-12
-8 VDC AT P253-13
8 VDC AT P253-14

ARE VOLTAGES PRESENT?

CHECK FOR OPEN BETWEEN:
P253-12 AND P400-19
P253-13 AND P400-13
P253-14 AND P400-5

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

CHECK FOR OPEN BETWEEN:
P253-9 AND GS427-L
P253-10 AND GS427-M
P253-11 AND GS425-D

DOES OPEN EXIST?

REPLACE PILOT **FUEL LBX10** INDICATOR.

TM 55-1520-238-23.

MM04/1-973A

END OF TASK

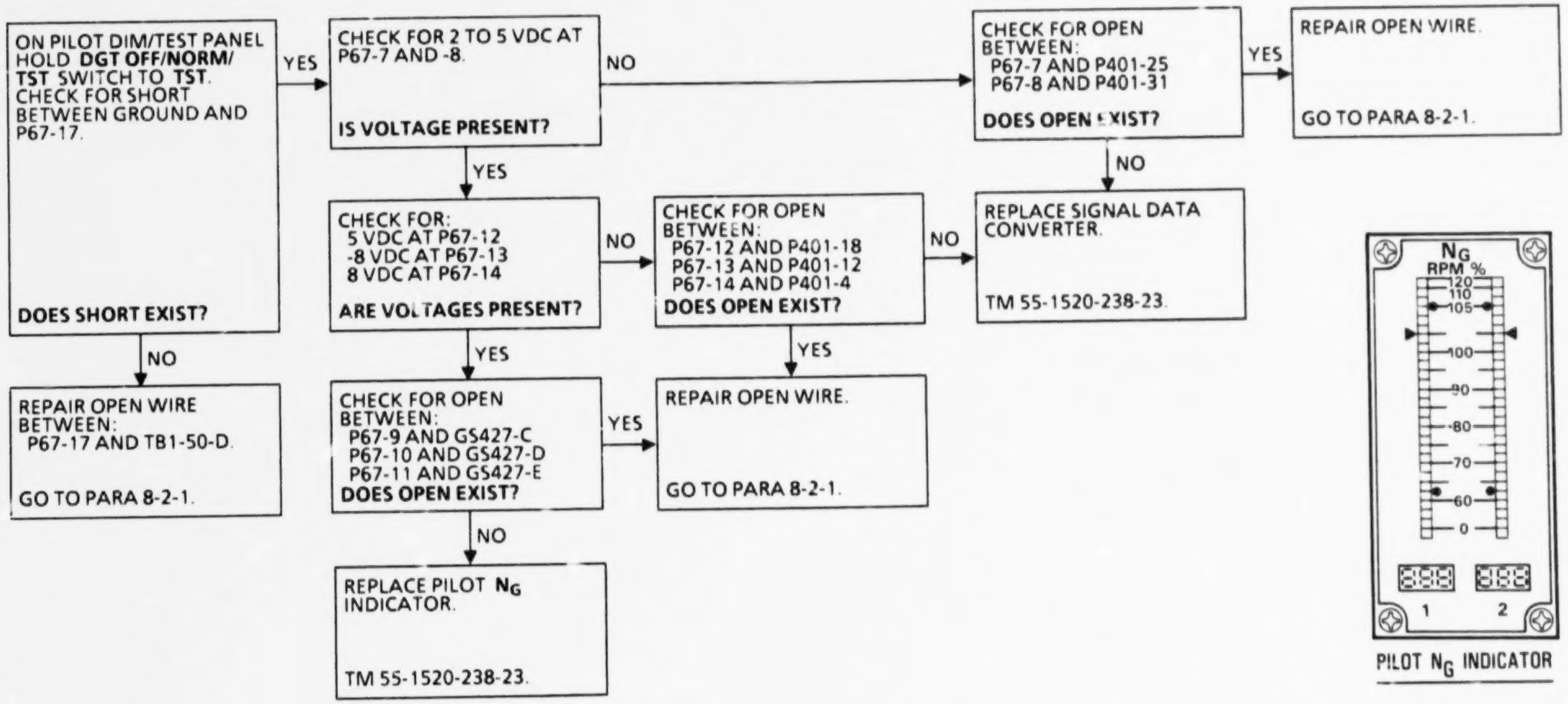
8-2-15. PILOT N_G INDICATOR - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8'S OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED.

Tools: (para 8-2-14)

Personnel Required: (para 8-2-14)

References: (para 8-2-14)

Equipment Conditions: (para 8-2-14)



ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH TO **TST**. CHECK FOR SHORT BETWEEN GROUND AND P67-17.

DOES SHORT EXIST?

YES

CHECK FOR 2 TO 5 VDC AT P67-7 AND -8.

IS VOLTAGE PRESENT?

NO

CHECK FOR OPEN BETWEEN:
P67-7 AND P401-25
P67-8 AND P401-31

DOES OPEN EXIST?

YES

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

NO

REPLACE SIGNAL DATA CONVERTER.

TM 55-1520-238-23.

YES

CHECK FOR:
5 VDC AT P67-12
-8 VDC AT P67-13
8 VDC AT P67-14

ARE VOLTAGES PRESENT?

NO

CHECK FOR OPEN BETWEEN:
P67-12 AND P401-18
P67-13 AND P401-12
P67-14 AND P401-4

DOES OPEN EXIST?

NO

YES

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

YES

CHECK FOR OPEN BETWEEN:
P67-9 AND GS427-C
P67-10 AND GS427-D
P67-11 AND GS427-E

DOES OPEN EXIST?

YES

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

NO

REPLACE PILOT N_G INDICATOR.

TM 55-1520-238-23.

NO

REPAIR OPEN WIRE BETWEEN:
P67-17 AND TB1-50-D.

GO TO PARA 8-2-1.

PILOT N_G INDICATOR

MM04/1-980

END OF TASK

8-2-16. PILOT ENG-RTR INDICATOR - DOES NOT INDICATE FULL SCALE OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

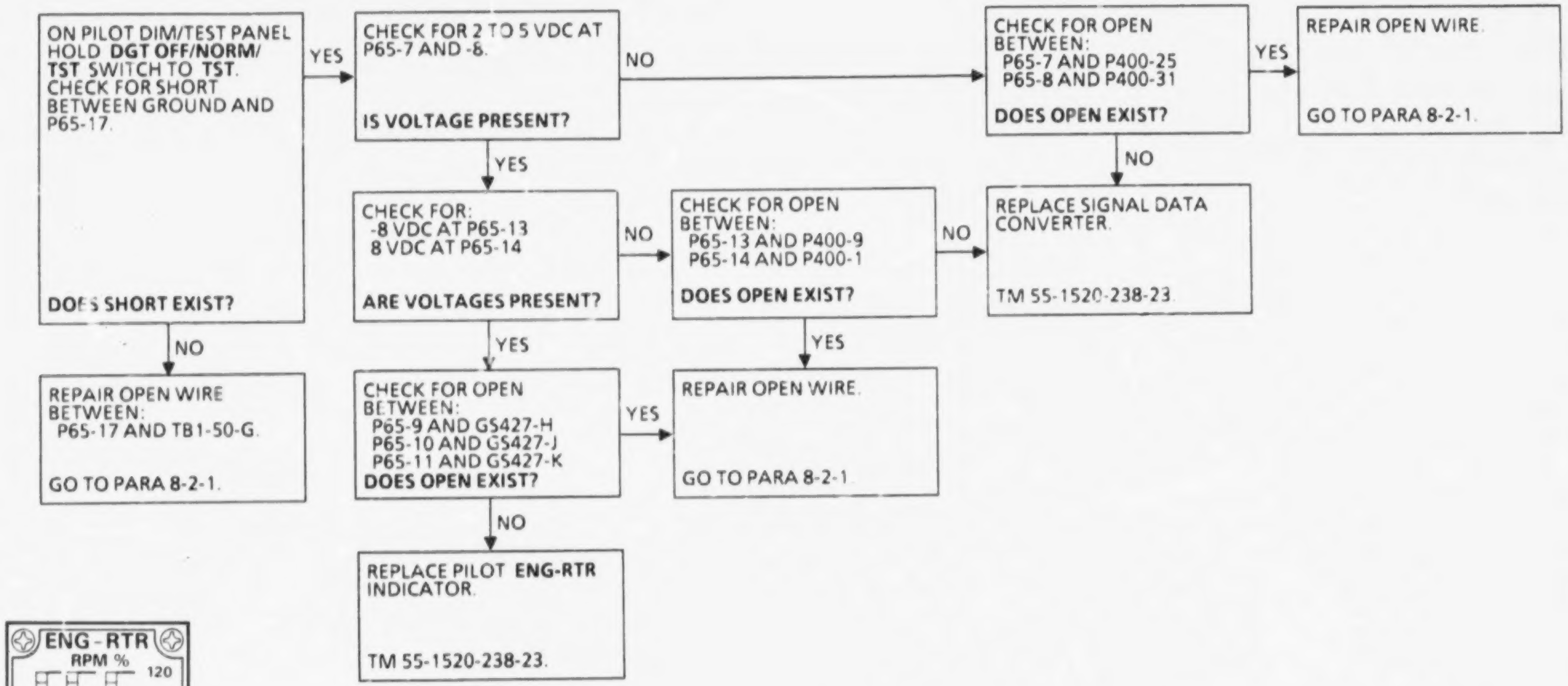
TM 55-1520-238-23

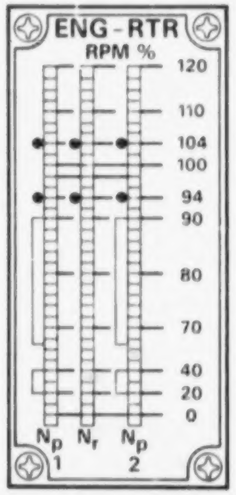
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON PILOT DIM/TEST PANEL HOLD DGT OFF/NORM/ TST SWITCH TO TST. CHECK FOR SHORT BETWEEN GROUND AND P65-17.
DOES SHORT EXIST?
YES
NO
REPAIR OPEN WIRE BETWEEN: P65-17 AND TB1-50-G.
GO TO PARA 8-2-1.
CHECK FOR 2 TO 5 VDC AT P65-7 AND -8.
IS VOLTAGE PRESENT?
NO
YES
CHECK FOR: -8 VDC AT P65-13 8 VDC AT P65-14
ARE VOLTAGES PRESENT?
NO
YES
CHECK FOR OPEN BETWEEN: P65-9 AND GS427-H P65-10 AND GS427-J P65-11 AND GS427-K
DOES OPEN EXIST?
YES
NO
REPLACE PILOT ENG-RTR INDICATOR.
TM 55-1520-238-23.
CHECK FOR OPEN BETWEEN: P65-13 AND P400-9 P65-14 AND P400-1
DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
CHECK FOR OPEN BETWEEN: P65-7 AND P400-25 P65-8 AND P400-31
DOES OPEN EXIST?
YES
NO
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.


ENG - RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2

PILOT ENG-RTR INDICATOR

MM04/1-981

END OF TASK

8-2-17. PILOT ENG OIL INDICATOR - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8'S OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED

Tools: (para 8-2-16)

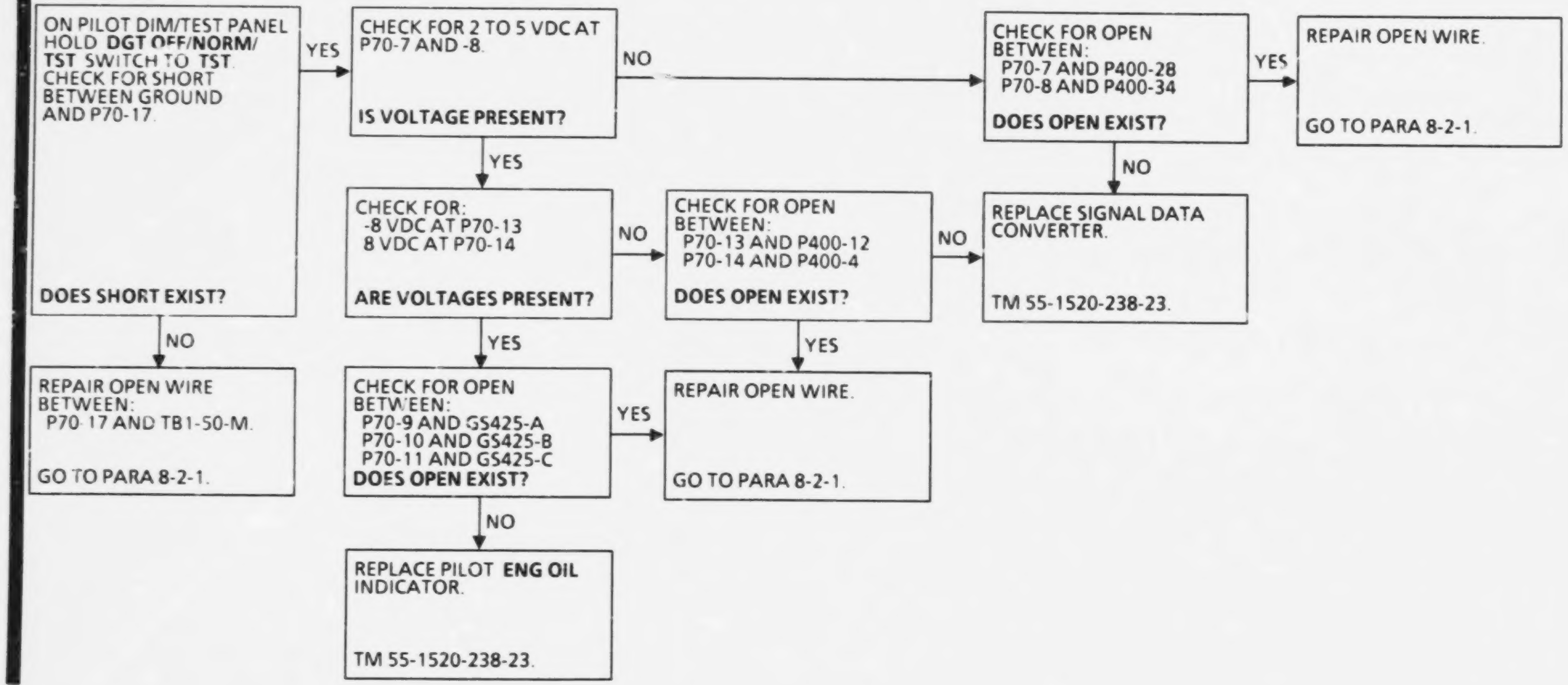
Personnel Required: (para 8-2-16)

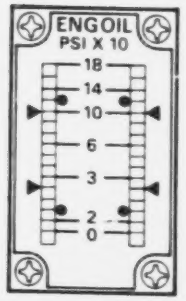
References: (para 8-2-16)

Equipment Conditions: (para 8-2-16)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON PILOT DIM/TEST PANEL HOLD DGT OFF/NORM/ TST SWITCH TO TST. CHECK FOR SHORT BETWEEN GROUND AND P70-17.
DOES SHORT EXIST?
YES
CHECK FOR 2 TO 5 VDC AT P70-7 AND -8.
IS VOLTAGE PRESENT?
NO
CHECK FOR OPEN BETWEEN: P70-7 AND P400-28 P70-8 AND P400-34
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
YES
NO
CHECK FOR: -8 VDC AT P70-13 8 VDC AT P70-14
ARE VOLTAGES PRESENT?
NO
CHECK FOR OPEN BETWEEN: P70-13 AND P400-12 P70-14 AND P400-4
DOES OPEN EXIST?
NO
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.
NO
REPAIR OPEN WIRE BETWEEN: P70-17 AND TB1-50-M.
GO TO PARA 8-2-1.
YES
CHECK FOR OPEN BETWEEN: P70-9 AND GS425-A P70-10 AND GS425-B P70-11 AND GS425-C
DOES OPEN EXIST?
YES
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
REPLACE PILOT ENG OIL INDICATOR.
TM 55-1520-238-23.


ENG OIL
PSI X 10
18
14
10
6
3
2
0

PILOT ENGINE OIL PRESSURE INDICATOR

MM04/1-982

END OF TASK

8-2-18. PILOT TGT, TORQUE, FUEL LBX10, AND N_G INDICATOR DIGITAL READOUTS - ARE NOT BLANKED OUT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

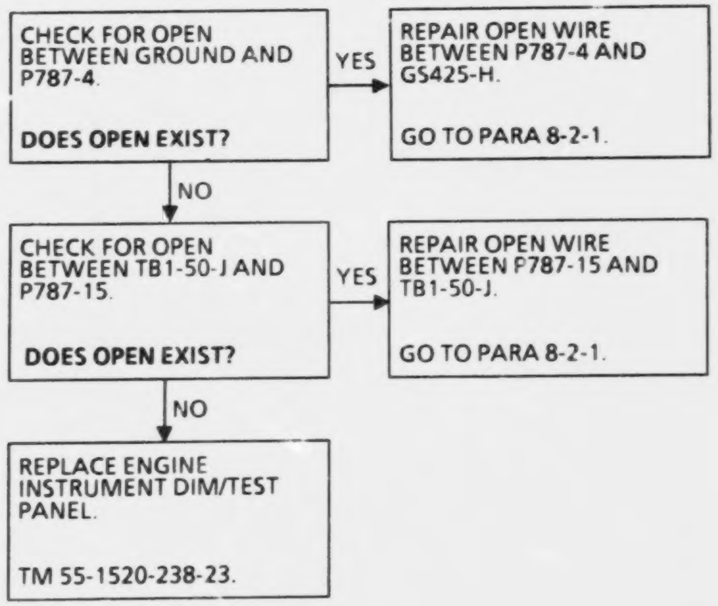
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



CHECK FOR OPEN BETWEEN GROUND AND P787-4.

DOES OPEN EXIST?

YES: REPAIR OPEN WIRE BETWEEN P787-4 AND GS425-H.

GO TO PARA 8-2-1.

NO: CHECK FOR OPEN BETWEEN TB1-50-J AND P787-15.

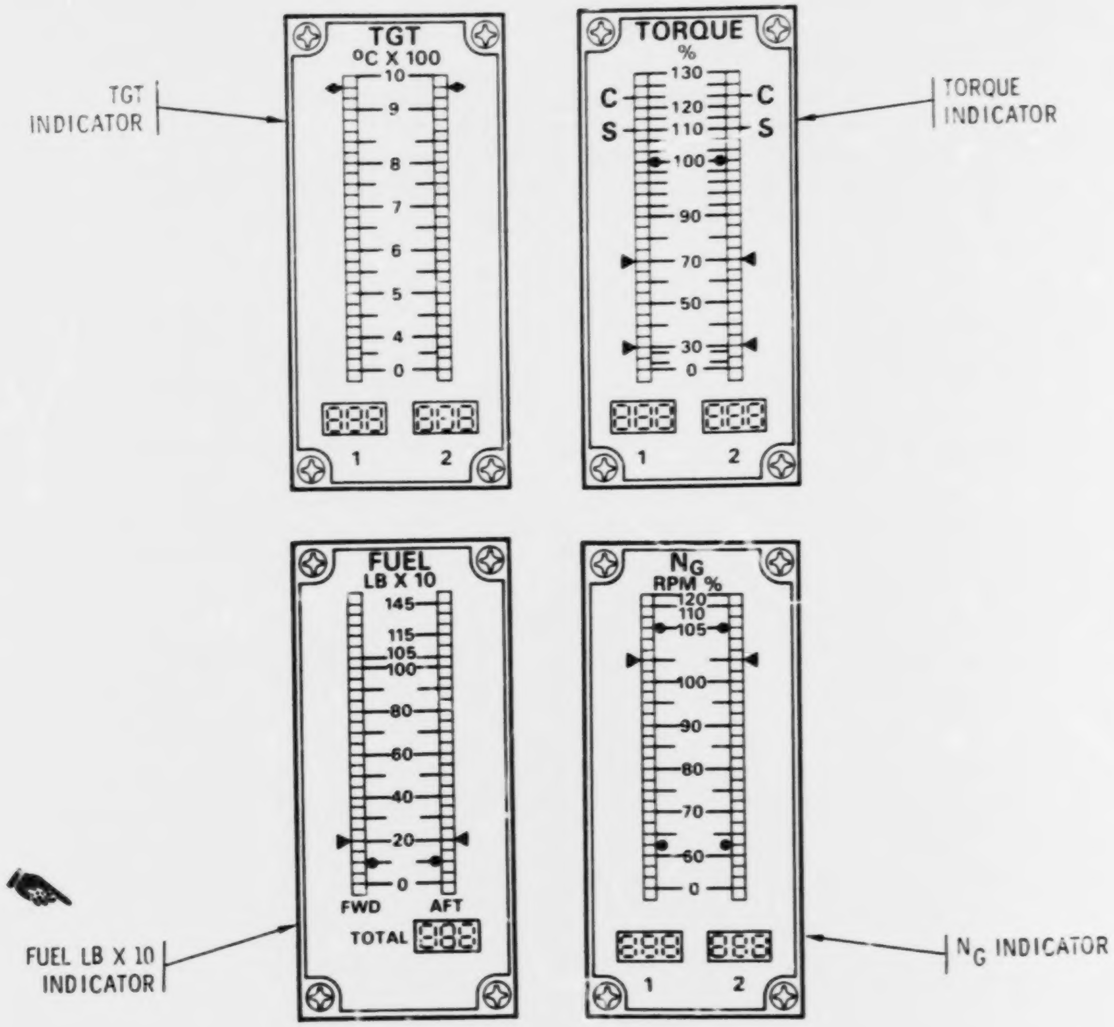
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE BETWEEN P787-15 AND TB1-50-J.

GO TO PARA 8-2-1.

NO: REPLACE ENGINE INSTRUMENT DIM/TEST PANEL.

TM 55-1520-238-23.


TGT INDICATOR
TGT
°C X 100
10
9
8
7
6
5
4
0
1
2
TORQUE INDICATOR
TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
1
2
FUEL LB X 10 INDICATOR
FUEL
LB X 10
145
115
105
100
80
60
40
20
0
FWD
AFT
TOTAL
N_G INDICATOR
N_G
RPM %
120
110
105
100
90
80
70
60
0
1
2

PILOT ENGINE INSTRUMENTS

MM04/1-983A

END OF TASK

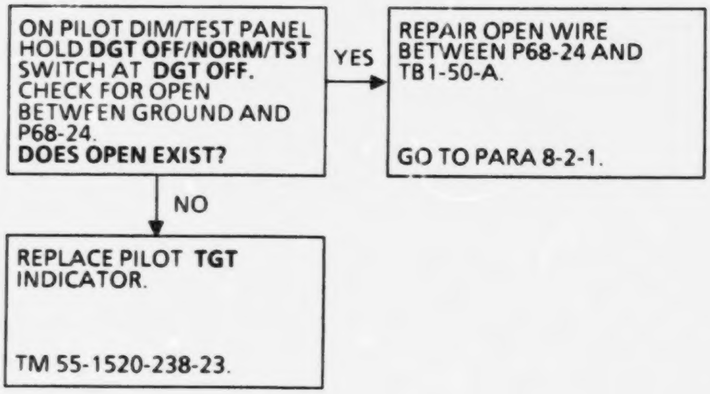
8-2-19. PILOT TGT INDICATOR DIGITAL READOUT - ARE NOT BLANKED OUT

Tools: (para 8-2-18)

Personnel Required: (para 8-2-18)

References: (para 8-2-18)

Equipment Conditions: (para 8-2-18)



ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH AT **DGT OFF.** CHECK FOR OPEN BETWEEN GROUND AND P68-24. **DOES OPEN EXIST?**

REPAIR OPEN WIRE BETWEEN P68-24 AND TB1-50-A.

GO TO PARA 8-2-1.

REPLACE PILOT **TGT** INDICATOR.

TM 55-1520-238-23.

END OF TASK

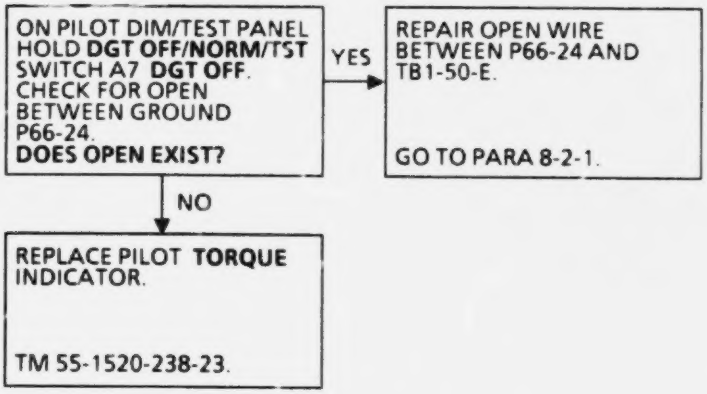
8-2-20. PILOT TORQUE INDICATOR DIGITAL READOUTS - ARE NOT BLANKED OUT

Tools: (para 8-2-18)

Personnel Required: (para 8-2-18)

References: (para 8-2-18)

Equipment Conditions: (para 8-2-18)


ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH A7 **DGT OFF**. CHECK FOR OPEN BETWEEN GROUND P66-24.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN P66-24 AND TB1-50-E.
GO TO PARA 8-2-1.
NO
REPLACE PILOT **TORQUE** INDICATOR.
TM 55-1520-238-23.

END OF TASK

8-2-21. PILOT FUEL LBX10 INDICATOR DIGITAL READOUTS - ARE NOT BLANKED OUT

Tools:

Nomenclature	Part Number
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

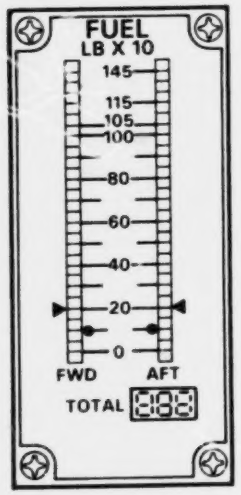
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

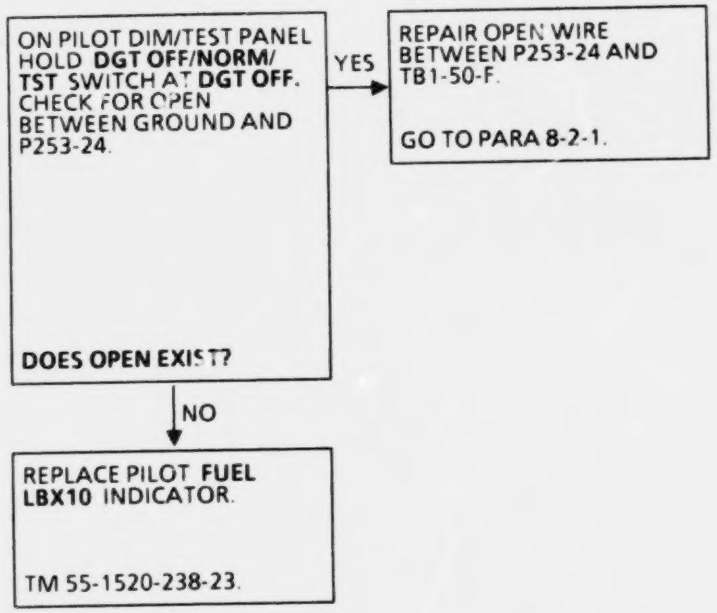
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



PILOT FUEL LB X 10 INDICATOR

MM04/1-984A



ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH AT **DGT OFF.** CHECK FOR OPEN BETWEEN GROUND AND P253-24.

DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN P253-24 AND TB1-50-F.

GO TO PARA 8-2-1.

REPLACE PILOT **FUEL LBX10** INDICATOR.

TM 55-1520-238-23.

END OF TASK

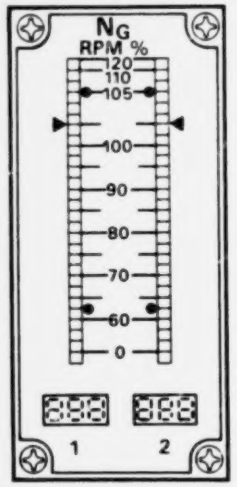
8-2-22. PILOT N_G INDICATOR DIGITAL READOUTS - ARE NOT BLANKED OUT

Tools: (para 8-2-21)

Personnel Required: (para 8-2-21)

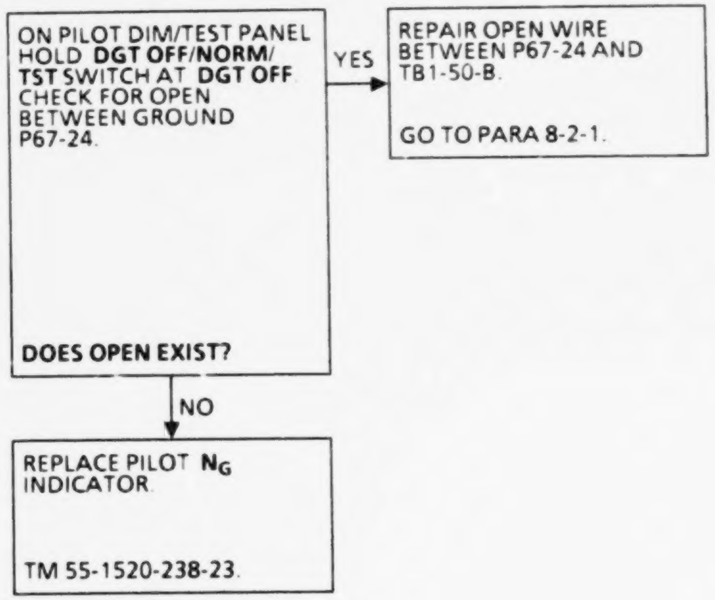
References: (para 8-2-21)

Equipment Conditions: (para 8-2-21)



PILOT N_G INDICATOR

MM04/1-985



ON PILOT DIM/TEST PANEL HOLD **DGT OFF/NORM/TST** SWITCH AT **DGT OFF** CHECK FOR OPEN BETWEEN GROUND P67-24.

DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN P67-24 AND TB1-50-B.

GO TO PARA 8-2-1.

REPLACE PILOT **N_G** INDICATOR.

TM 55-1520-238-23.

END OF TASK

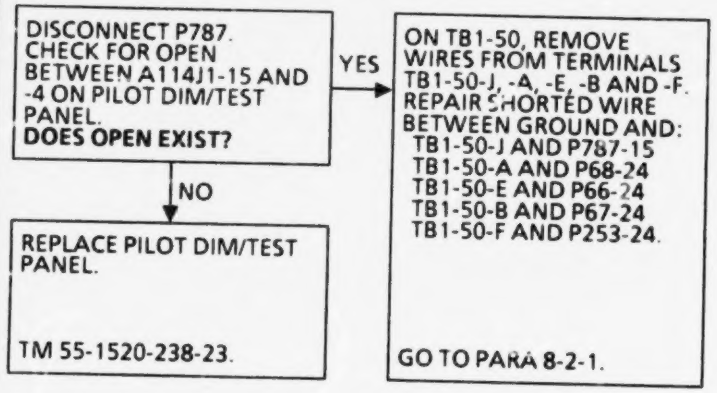
8-2-23. PILOT TGT, TORQUE, FUEL LBX10, AND N$_G$ INDICATOR DIGITAL READOUTS - ARE BLANKED OUT

Tools: (para 8-2-21)

Personnel Required: (para 8-2-21)

References: (para 8-2-21)

Equipment Conditions: (para 8-2-21)



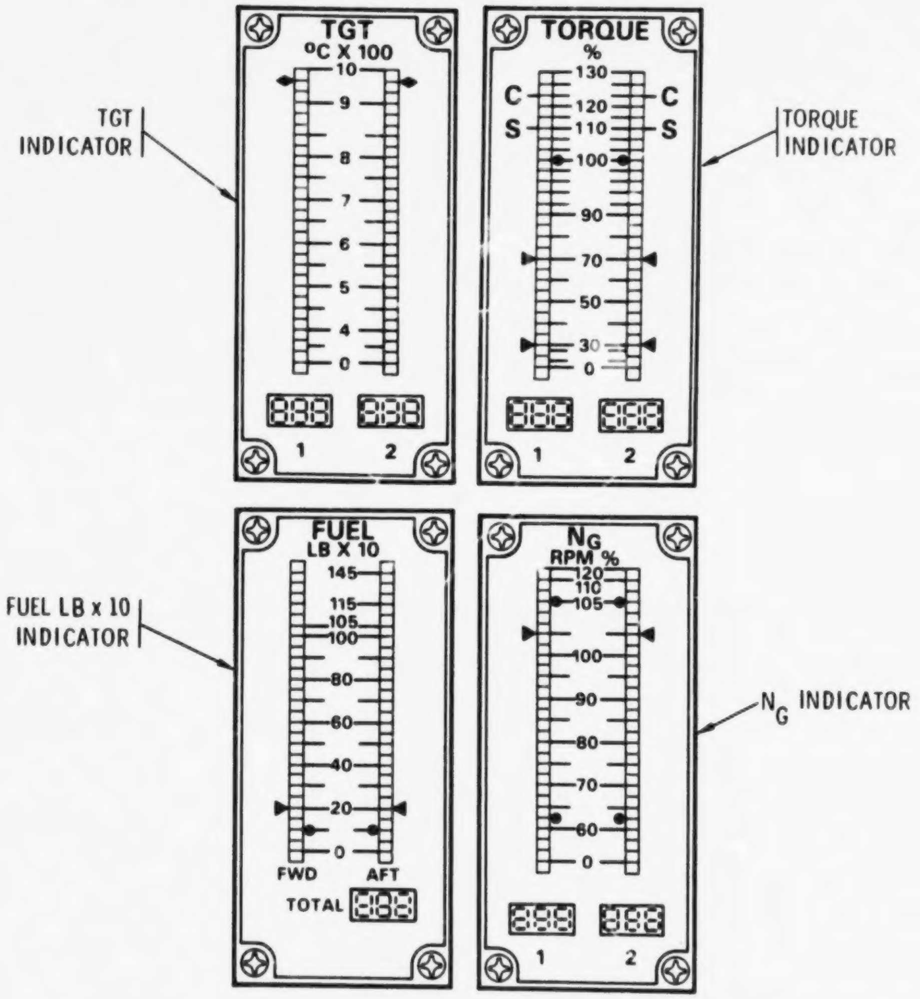
DISCONNECT P787.
CHECK FOR OPEN BETWEEN A114J1-15 AND -4 ON PILOT DIM/TEST PANEL.
DOES OPEN EXIST?

ON TB1-50, REMOVE WIRES FROM TERMINALS TB1-50-J, -A, -E, -B AND -F.
REPAIR SHORTED WIRE BETWEEN GROUND AND:
TB1-50-J AND P787-15
TB1-50-A AND P68-24
TB1-50-E AND P66-24
TB1-50-B AND P67-24
TB1-50-F AND P253-24.

GO TO PARA 8-2-1.

REPLACE PILOT DIM/TEST PANEL.

TM 55-1520-238-23.


TGT
°C X 100
TGT INDICATOR
TORQUE
%
C
S
TORQUE INDICATOR
FUEL
LB X 10
FWD
AFT
TOTAL
FUEL LB x 10 INDICATOR
N$_G$
RPM %
N$_G$ INDICATOR
1
2

PILOT ENGINE INSTRUMENTS

MM04/1-986A

END OF TASK

8-2-24. PILOT ENG OIL, TGT, TORQUE, FUEL LBX10, ENG-RTR, AND N_G INDICATOR VERTICAL DISPLAY LAMPS - DO NOT DIM (AUTO DIM)

Tools:

Nomenclature	Part Number
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

Personnel Required:

68F10 Aircraft Electrician
One person to assist

References:

TM 55-1520-238-23

WARNING

Turn off power before disconnecting or reconnecting wires and connectors High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

8-2-24

DISCONNECT P787. COVER PHOTOCELL ON PILOT DIM/TEST PANEL TO STOP LIGHT PENETRATION. CHECK RESISTANCE BETWEEN A114J1-5 AND -6.
IS RESISTANCE MORE THAN 50K OHMS?

NO → REPLACE PILOT DIM/TEST PANEL. TM 55-1520-238-23.

YES → WITH PILOT **ENG INST** CIRCUIT BREAKER CLOSED, CHECK FOR 6 VDC AT P787-5.
IS VOLTAGE PRESENT?

YES → CHECK FOR OPEN BETWEEN P401-16 AND P787-6.
DOES OPEN EXIST?

YES → REPAIR OPEN WIRE. GO TO PARA 8-2-1.

NO → REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23.

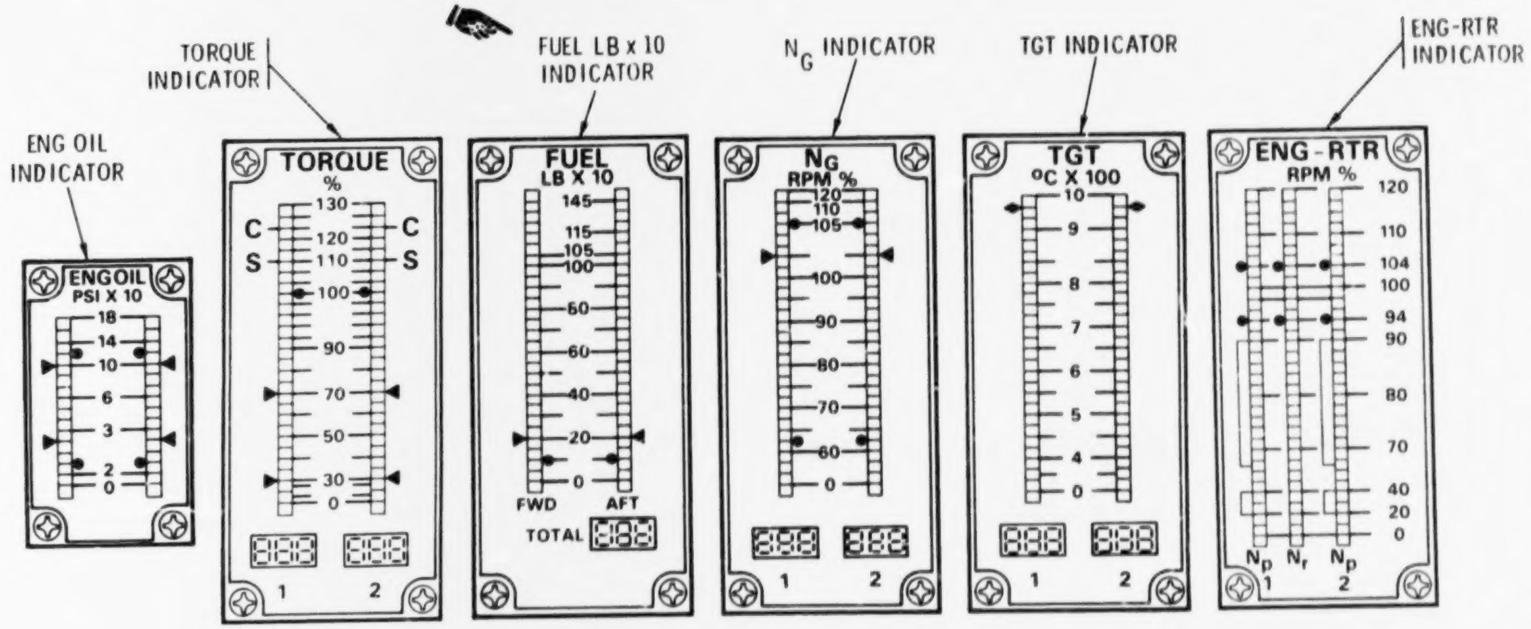
NO → WITH PILOT **ENG INST** CIRCUIT BREAKER CLOSED, CHECK FOR 6 VDC AT A82-1J2-15 ON SIGNAL DATA CONVERTER.
IS VOLTAGE PRESENT?

YES → CHECK FOR OPEN BETWEEN P401-15 AND P787-5. REPAIR OPEN WIRE. GO TO PARA 8-2-1.

NO → CHECK FOR SHORT BETWEEN GROUND AND P401-15.
DOES SHORT EXIST?

YES → REPAIR SHORTED WIRE. GO TO PARA 8-2-1.

NO → REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23.


ENG OIL INDICATOR
TORQUE INDICATOR
FUEL LB x 10 INDICATOR
N_G INDICATOR
TGT INDICATOR
ENG-RTR INDICATOR
ENGOIL PSI X 10
18 14 10 6 3 2 0
TORQUE %
C S C S
130 120 110 100 90 70 50 30 0
1 2
FUEL LB X 10
145 115 105 100 60 60 40 20 0
FWD AFT
TOTAL
N_G RPM %
120 110 105 100 90 80 70 60 0
1 2
TGT °C X 100
10 9 8 7 6 5 4 0
1 2
ENG-RTR RPM %
120 110 104 100 94 90 80 70 40 20 0
N_p N_r N_p
1 2

PILOT ENGINE INSTRUMENTS

MM04/1-987A

END OF TASK

8-2-25. PILOT ENG OIL, TGT, TORQUE, FUEL LBX10, ENG-RTR, AND N$_G$ INDICATOR VERTICAL DISPLAY LAMPS - DO NOT DIM (MANUAL DIM)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

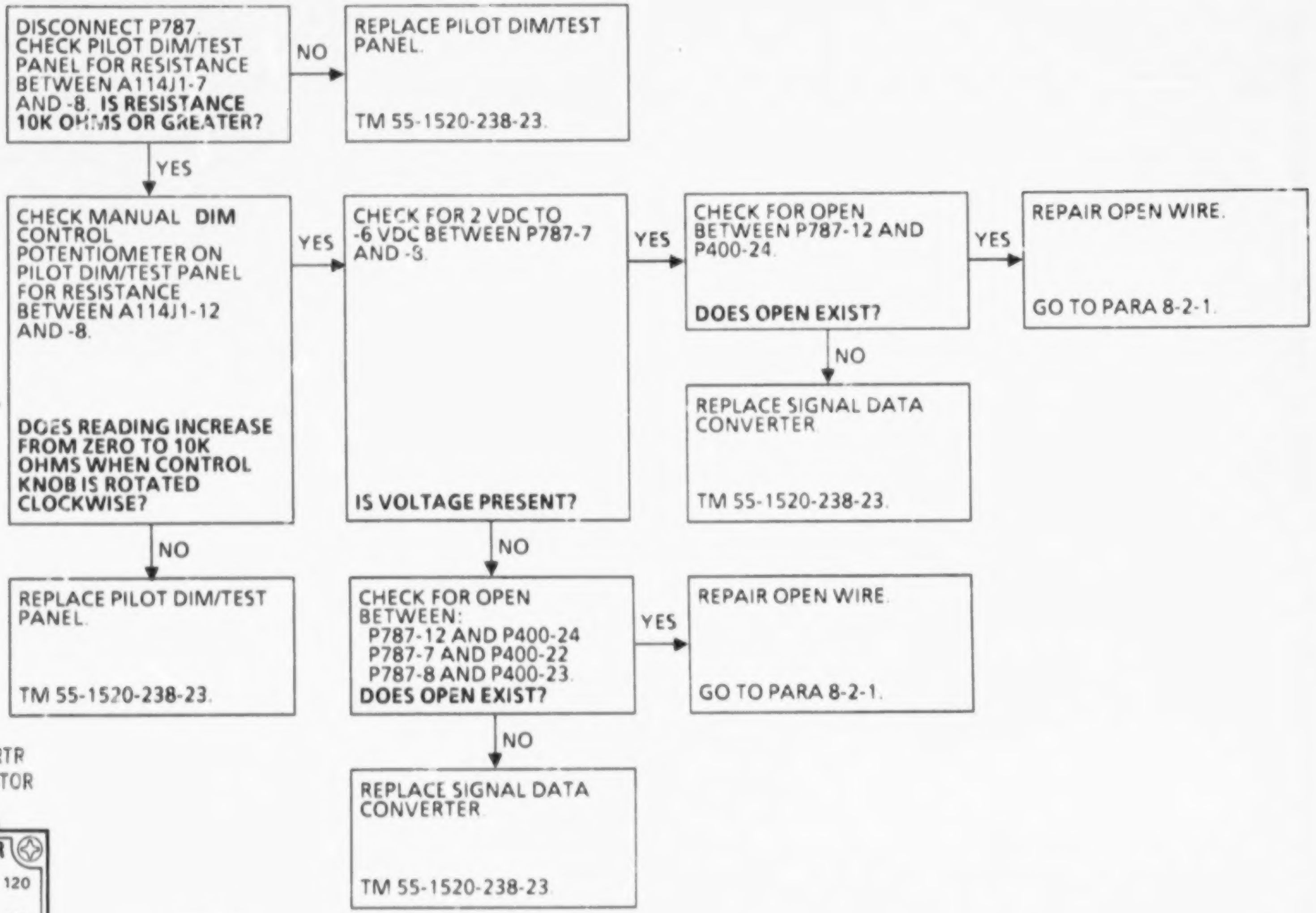
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



DISCONNECT P787. CHECK PILOT DIM/TEST PANEL FOR RESISTANCE BETWEEN A114J1-7 AND -8. **IS RESISTANCE 10K OHMS OR GREATER?**

REPLACE PILOT DIM/TEST PANEL. TM 55-1520-238-23.

CHECK MANUAL DIM CONTROL POTENTIOMETER ON PILOT DIM/TEST PANEL FOR RESISTANCE BETWEEN A114J1-12 AND -8. **DOES READING INCREASE FROM ZERO TO 10K OHMS WHEN CONTROL KNOB IS ROTATED CLOCKWISE?**

REPLACE PILOT DIM/TEST PANEL. TM 55-1520-238-23.

CHECK FOR 2 VDC TO -6 VDC BETWEEN P787-7 AND -8. **IS VOLTAGE PRESENT?**

CHECK FOR OPEN BETWEEN P787-12 AND P400-24. **DOES OPEN EXIST?**

REPAIR OPEN WIRE. GO TO PARA 8-2-1.

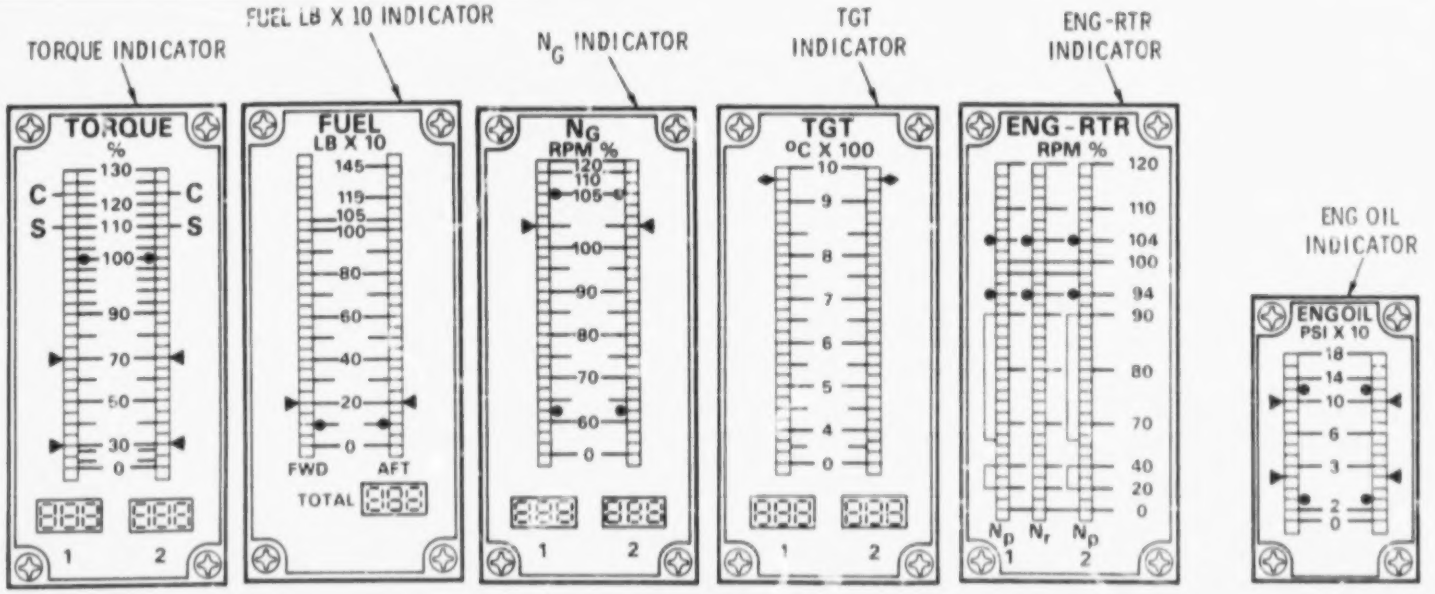
REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P787-12 AND P400-24
P787-7 AND P400-22
P787-8 AND P400-23.
DOES OPEN EXIST?

REPAIR OPEN WIRE. GO TO PARA 8-2-1.

REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23.

NO
YES
YES
YES
YES
NO
NO
YES
NO



TORQUE INDICATOR
FUEL LB X 10 INDICATOR
N$_G$ INDICATOR
TGT INDICATOR
ENG-RTR INDICATOR
ENG OIL INDICATOR
TORQUE %
C S
FUEL LB X 10
FWD AFT TOTAL
N$_G$ RPM %
TGT °C X 100
ENG - RTR RPM %
N$_p$ 1 N$_r$ N$_p$ 2
ENG OIL PSI X 10

PILOT ENGINE INSTRUMENTS

MM04/1-988A

END OF TASK

8-2-26. PILOT TGT INDICATOR VERTICAL DISPLAY SCALES OR DIGITAL READOUTS - DO NOT INDICATE AMBIENT TEMPERATURE +5 DEGREES

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

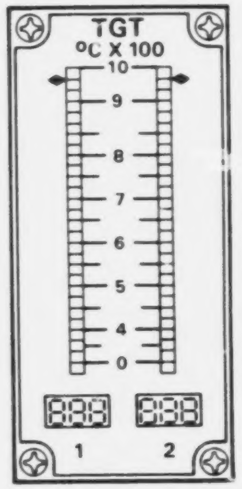
TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

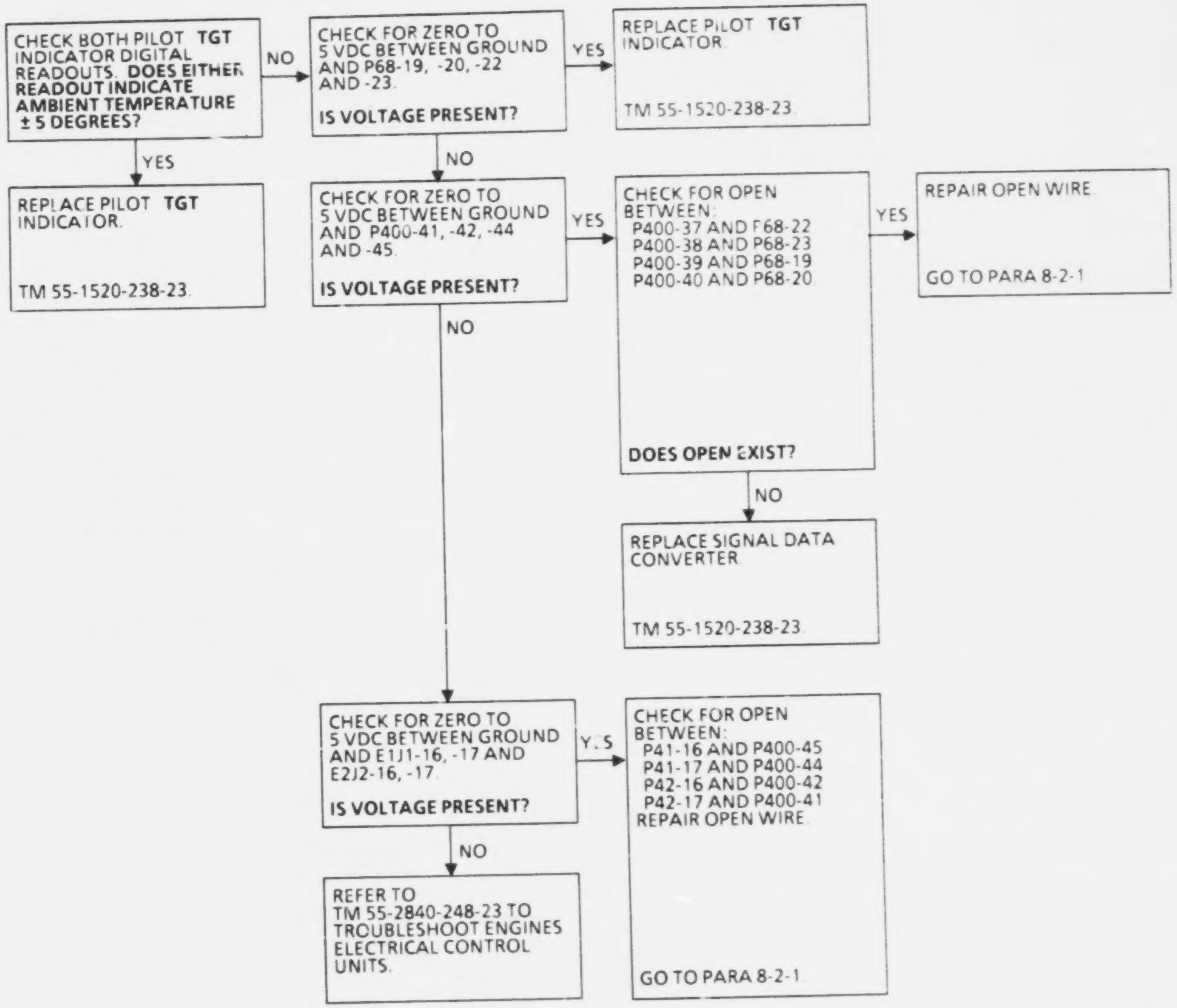
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



PILOT TGT INDICATOR

MM04/1-991



CHECK BOTH PILOT **TGT** INDICATOR DIGITAL READOUTS. **DOES EITHER READOUT INDICATE AMBIENT TEMPERATURE ± 5 DEGREES?**

REPLACE PILOT **TGT** INDICATOR.

TM 55-1520-238-23.

CHECK FOR ZERO TO 5 VDC BETWEEN GROUND AND P68-19, -20, -22 AND -23.

IS VOLTAGE PRESENT?

REPLACE PILOT **TGT** INDICATOR.

TM 55-1520-238-23.

CHECK FOR ZERO TO 5 VDC BETWEEN GROUND AND P400-41, -42, -44 AND -45.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN:
P400-37 AND P68-22
P400-38 AND P68-23
P400-39 AND P68-19
P400-40 AND P68-20

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPLACE SIGNAL DATA CONVERTER.

TM 55-1520-238-23.

CHECK FOR ZERO TO 5 VDC BETWEEN GROUND AND E1J1-16, -17 AND E2J2-16, -17.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN:
P41-16 AND P400-45
P41-17 AND P400-44
P42-16 AND P400-42
P42-17 AND P400-41
REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINES ELECTRICAL CONTROL UNITS.

END OF TASK

8-2-27. PILOT TORQUE INDICATOR VERTICAL DISPLAY SCALES OR DIGITAL READOUTS - DO NOT INDICATE BETWEEN ZERO AND TWO PERCENT

Tools: (para 8-2-26)

Personnel Required: (para 8-2-26)

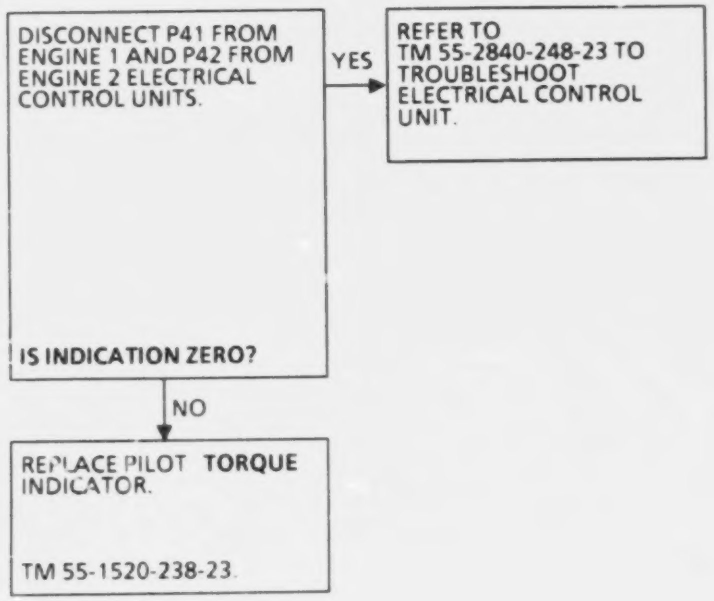
References: (para 8-2-26)

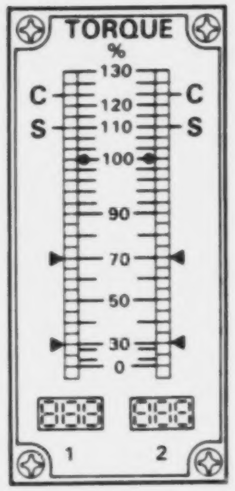
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN4 and RN4 doors opened
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


DISCONNECT P41 FROM ENGINE 1 AND P42 FROM ENGINE 2 ELECTRICAL CONTROL UNITS.
IS INDICATION ZERO?
YES
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ELECTRICAL CONTROL UNIT.
NO
REPLACE PILOT TORQUE INDICATOR.
TM 55-1520-238-23.


TORQUE
%
C
S
C
S
130
120
110
100
90
70
50
30
0
1
2

PILOT TORQUE INDICATOR

MM04/1-989

END OF TASK

8-2-28. PILOT N_G INDICATOR VERTICAL DISPLAY SCALES OR DIGITAL READOUTS - DO NOT INDICATE BETWEEN ZERO AND FIVE PERCENT

Tools: (para 8-2-26)

Personnel Required: (para 8-2-26)

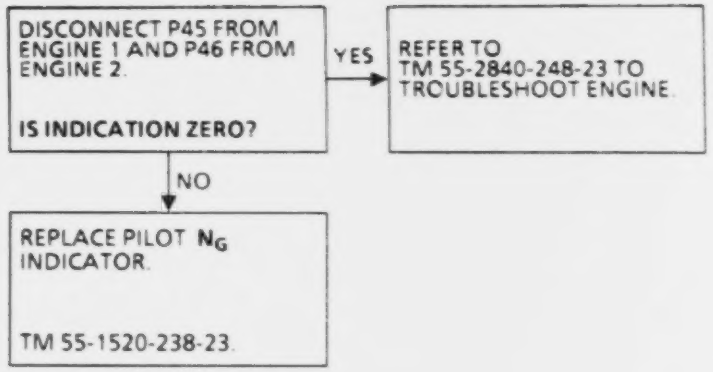
References: (para 8-2-26)

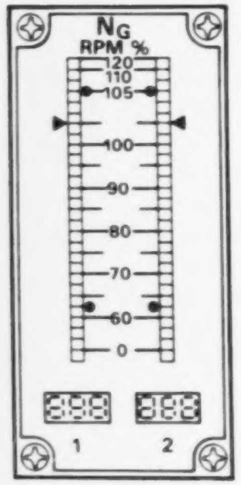
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L225 AND R225 access doors open
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


DISCONNECT P45 FROM ENGINE 1 AND P46 FROM ENGINE 2.
IS INDICATION ZERO?
YES
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE.
NO
REPLACE PILOT NG INDICATOR.
TM 55-1520-238-23.


NG
RPM %
120
110
105
100
90
80
70
60
0
1
2

PILOT N_G INDICATOR

MM04/1-990

END OF TASK

8-2-29. PILOT FUEL LBX10 INDICATOR VERTICAL DISPLAY SCALES OR DIGITAL READOUTS - DO NOT INDICATE EXISTING FUEL +20 POUNDS

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

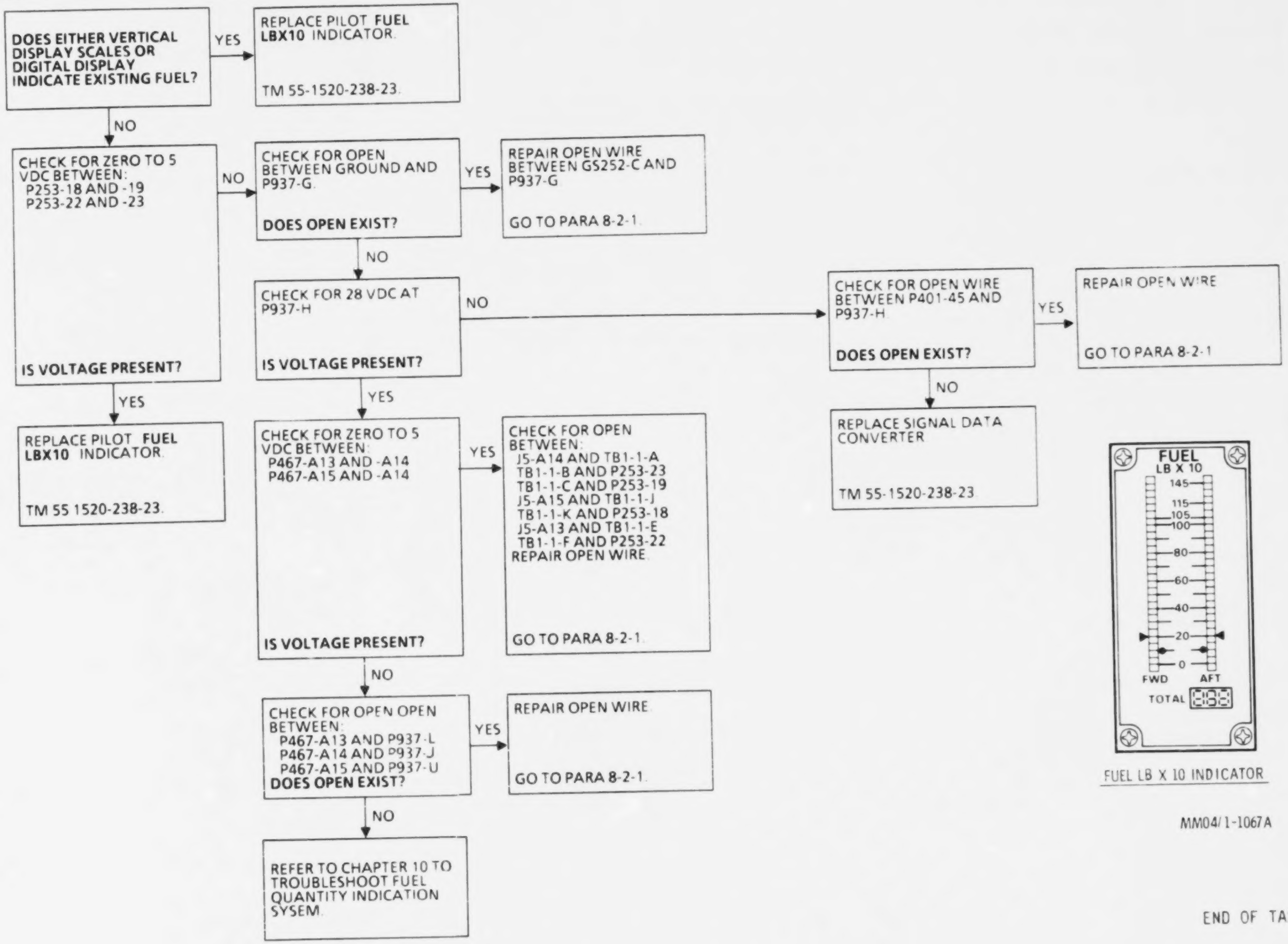
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



DOES EITHER VERTICAL DISPLAY SCALES OR DIGITAL DISPLAY INDICATE EXISTING FUEL?

YES: REPLACE PILOT **FUEL LBX10** INDICATOR. TM 55-1520-238-23.

NO: CHECK FOR ZERO TO 5 VDC BETWEEN:
P253-18 AND -19
P253-22 AND -23
IS VOLTAGE PRESENT?

YES: REPLACE PILOT **FUEL LBX10** INDICATOR. TM 55 1520-238-23.

NO: CHECK FOR OPEN BETWEEN GROUND AND P937-G.
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE BETWEEN GS252-C AND P937-G. GO TO PARA 8-2-1.

NO: CHECK FOR 28 VDC AT P937-H.
IS VOLTAGE PRESENT?

NO: CHECK FOR OPEN WIRE BETWEEN P401-45 AND P937-H.
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE. GO TO PARA 8-2-1.

NO: REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23.

YES: CHECK FOR ZERO TO 5 VDC BETWEEN:
P467-A13 AND -A14
P467-A15 AND -A14
IS VOLTAGE PRESENT?

YES: CHECK FOR OPEN BETWEEN:
J5-A14 AND TB1-1-A
TB1-1-B AND P253-23
TB1-1-C AND P253-19
J5-A15 AND TB1-1-J
TB1-1-K AND P253-18
J5-A13 AND TB1-1-E
TB1-1-F AND P253-22
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

NO: CHECK FOR OPEN OPEN BETWEEN:
P467-A13 AND P937-L
P467-A14 AND P937-J
P467-A15 AND P937-U
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE. GO TO PARA 8-2-1.

NO: REFER TO CHAPTER 10 TO TROUBLESHOOT FUEL QUANTITY INDICATION SYSEM.

FUEL LB X 10 INDICATOR

MM04/1-1067A

END OF TASK

8-2-30. PILOT ENG OIL INDICATOR VERTICAL DISPLAY SCALES - DO NOT INDICATE ZERO PRESSURE

Tools: (para 8-2-29)

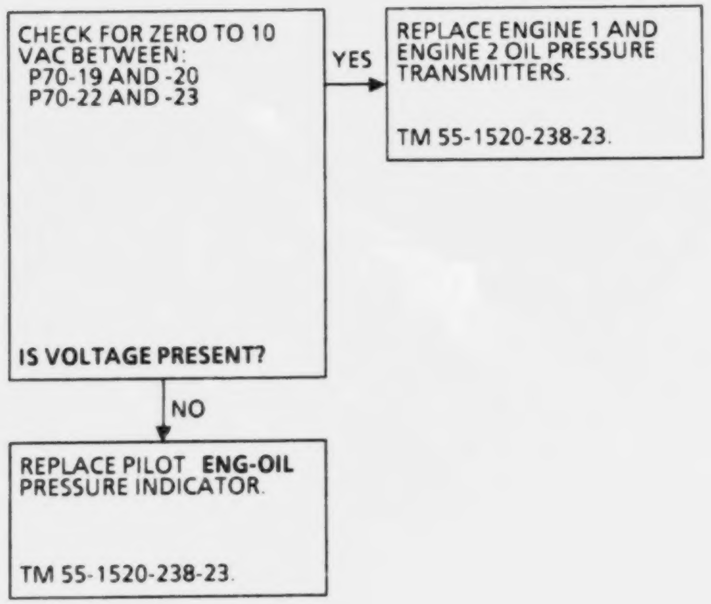
Personnel Required: (para 8-2-29)

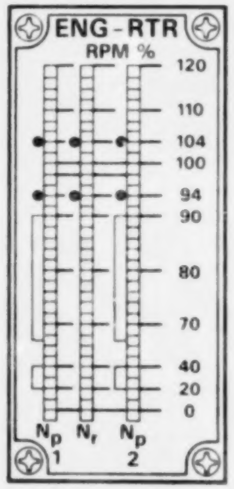
References: (para 8-2-29)

Equipment Conditions: (para 8-2-29)

WARNING

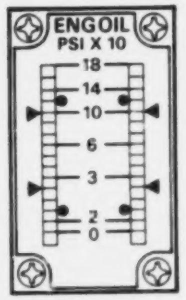
Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR ZERO TO 10 VAC BETWEEN:
P70-19 AND -20
P70-22 AND -23
IS VOLTAGE PRESENT?
YES
REPLACE ENGINE 1 AND ENGINE 2 OIL PRESSURE TRANSMITTERS.
TM 55-1520-238-23.
NO
REPLACE PILOT ENG-OIL PRESSURE INDICATOR.
TM 55-1520-238-23.


ENG - RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2

PILOT ENG-RTR INDICATOR

MM04/1-992


ENG OIL
PSI X 10
18
14
10
6
3
2
0

PILOT ENG OIL INDICATOR

MM04/1-993

END OF TASK

(All data on pages 8-40 thru 8-43 deleted)

8-2-31. PILOT ENG-RTR INDICATOR VERTICAL DISPLAY SCALES - DO NOT INDICATE ZERO PERCENT

Tools: (para 8-2-29)

Personnel Required: (para 8-2-29)

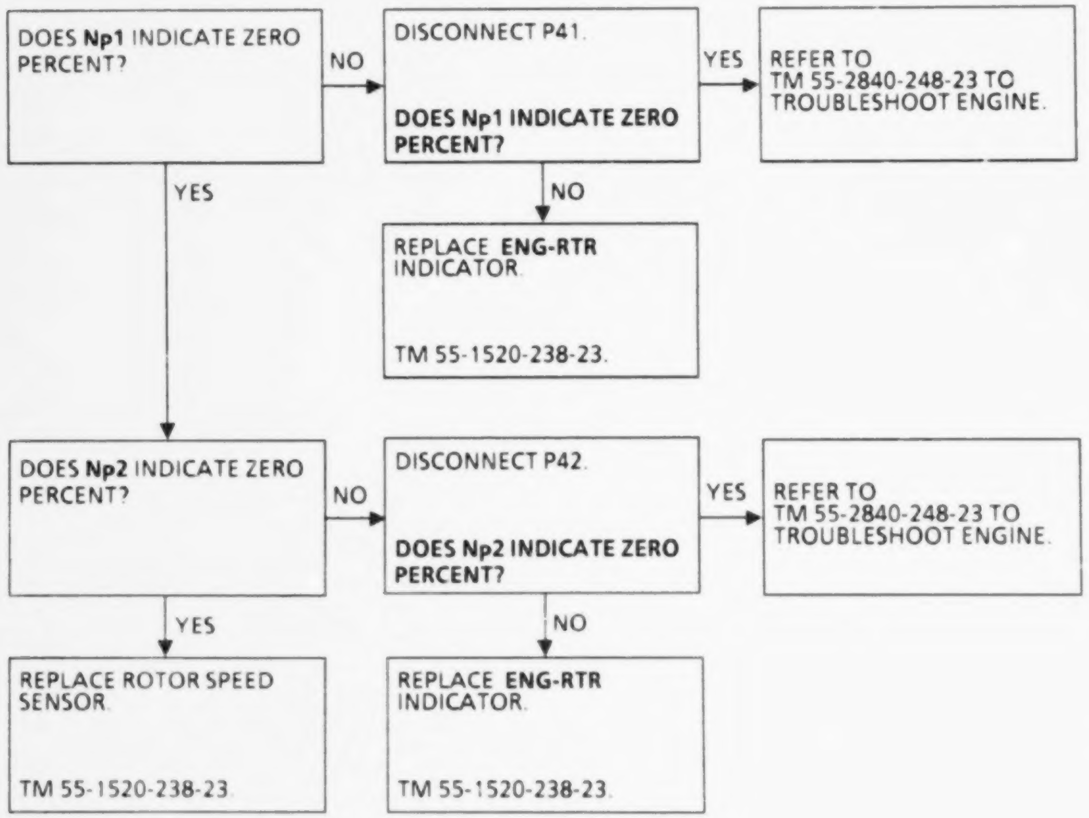
References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1, RN1, 250L, 250R, 290L, and 290R doors opened
	External power application - Electrical

REFER TO VOLTAGE WARNING


DOES Np1 INDICATE ZERO PERCENT?
NO
DISCONNECT P41.
DOES Np1 INDICATE ZERO PERCENT?
YES
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE.
NO
REPLACE ENG-RTR INDICATOR.
TM 55-1520-238-23.
YES
DOES Np2 INDICATE ZERO PERCENT?
NO
DISCONNECT P42.
DOES Np2 INDICATE ZERO PERCENT?
YES
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE.
YES
REPLACE ROTOR SPEED SENSOR.
TM 55-1520-238-23.
NO
REPLACE ENG-RTR INDICATOR.
TM 55-1520-238-23.

END OF TASK

8-2-33. CPG TORQUE INDICATOR - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8s OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED (HELICOPTERS WITHOUT CPG DIM/TEST PANEL INSTALLED)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

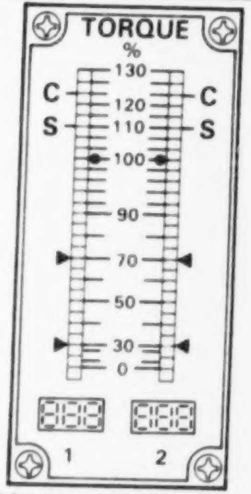
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

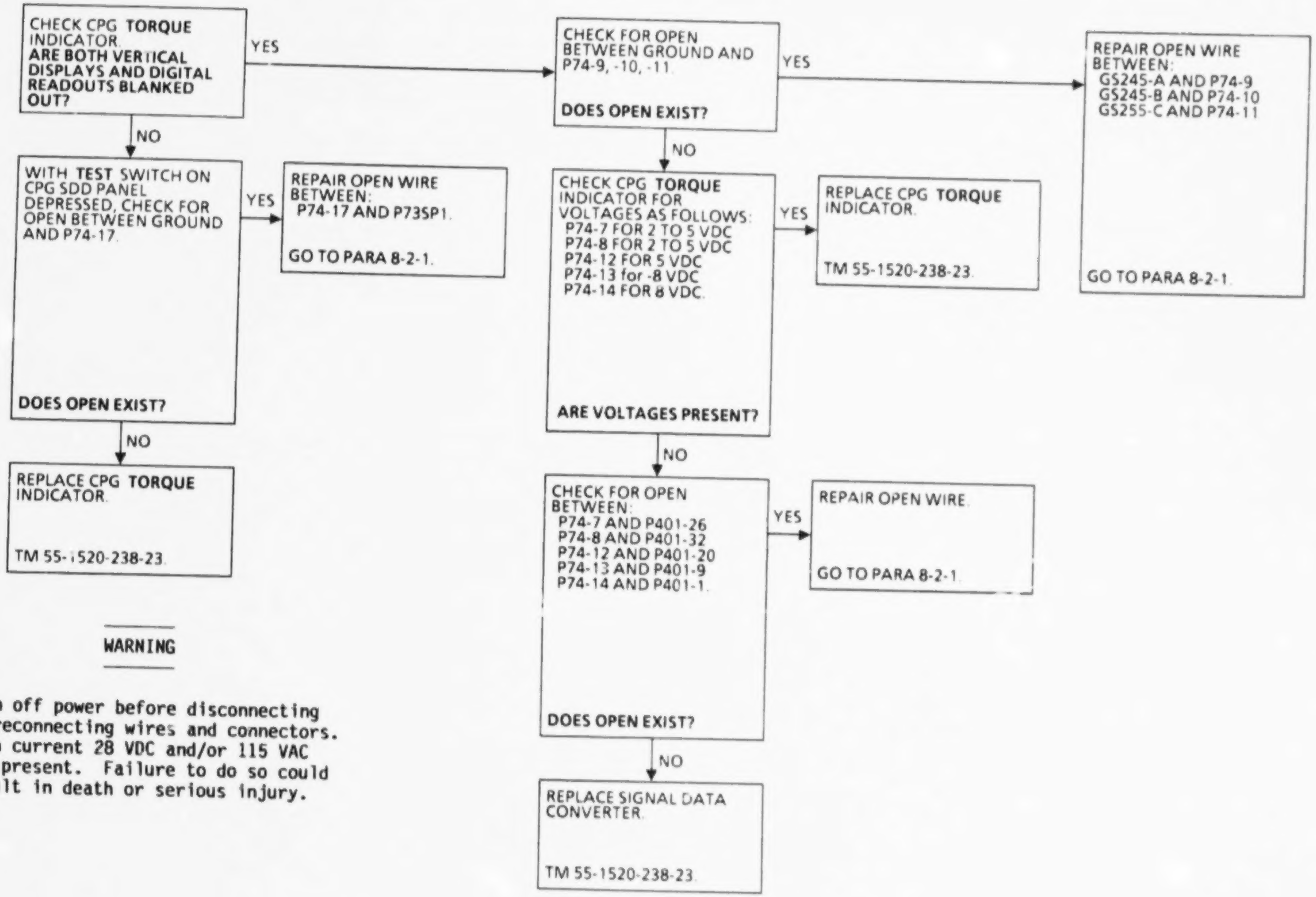
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - L40 cover removed
	External power application - Electrical


TORQUE
%
C
S
C
S
130
120
110
100
90
70
50
30
0
1
2

MM04/1-1068

CPG TORQUE INDICATOR


CHECK CPG TORQUE INDICATOR. ARE BOTH VERTICAL DISPLAYS AND DIGITAL READOUTS BLANKED OUT?
YES
NO
WITH TEST SWITCH ON CPG SDD PANEL DEPRESSED, CHECK FOR OPEN BETWEEN GROUND AND P74-17. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN: P74-17 AND P73SP1. GO TO PARA 8-2-1.
NO
REPLACE CPG TORQUE INDICATOR. TM 55-1520-238-23.
CHECK FOR OPEN BETWEEN GROUND AND P74-9, -10, -11. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN: GS245-A AND P74-9 GS245-B AND P74-10 GS255-C AND P74-11 GO TO PARA 8-2-1.
NO
CHECK CPG TORQUE INDICATOR FOR VOLTAGES AS FOLLOWS: P74-7 FOR 2 TO 5 VDC P74-8 FOR 2 TO 5 VDC P74-12 FOR 5 VDC P74-13 for -8 VDC P74-14 FOR 8 VDC. ARE VOLTAGES PRESENT?
YES
REPLACE CPG TORQUE INDICATOR. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P74-7 AND P401-26 P74-8 AND P401-32 P74-12 AND P401-20 P74-13 AND P401-9 P74-14 AND P401-1. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 8-2-1.
NO
REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23.

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

END OF TASK

8-2-34. CPG ENG-RTR INDICATOR VERTICAL DISPLAY SCALES - DO NOT INDICATE FULL SCALE OR HAVE EVERY OTHER LAMP NOT LIGHTED (HELICOPTERS WITHOUT CPG DIM/TEST PANEL INSTALLED)

Tools: (para 8-2-33)

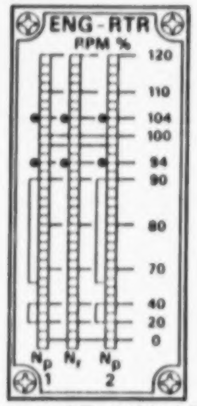
Personnel Required: (para 8-2-33)

References: (para 8-2-33)

Equipment Conditions: (para 8-2-33)

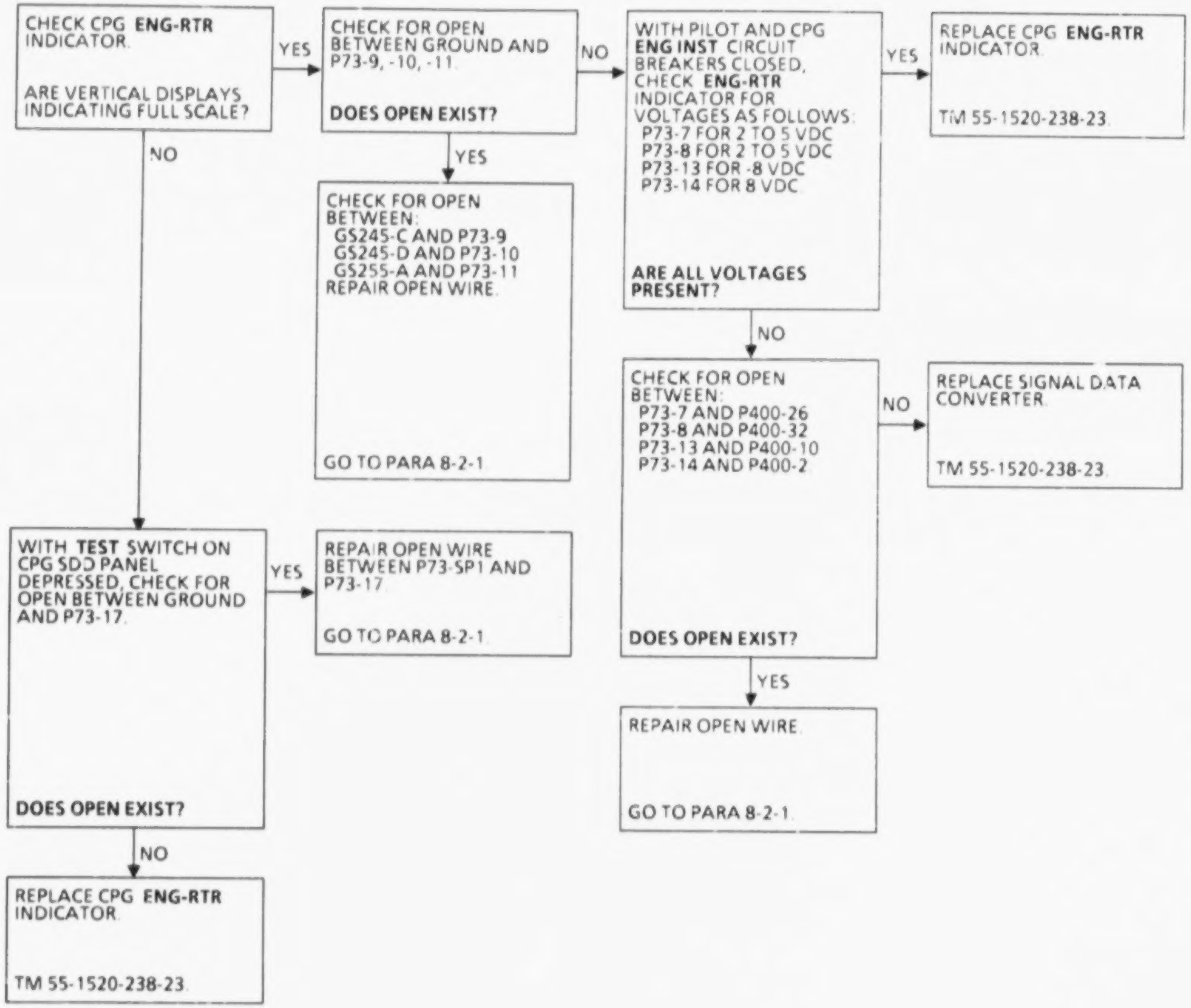
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ENG - RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2

CPG ENG-RTR INDICATOR

M104/1-1071


CHECK CPG ENG-RTR INDICATOR.
ARE VERTICAL DISPLAYS INDICATING FULL SCALE?
YES
CHECK FOR OPEN BETWEEN GROUND AND P73-9, -10, -11.
DOES OPEN EXIST?
NO
WITH PILOT AND CPG ENG INST CIRCUIT BREAKERS CLOSED, CHECK ENG-RTR INDICATOR FOR VOLTAGES AS FOLLOWS:
P73-7 FOR 2 TO 5 VDC
P73-8 FOR 2 TO 5 VDC
P73-13 FOR -8 VDC
P73-14 FOR 8 VDC
ARE ALL VOLTAGES PRESENT?
YES
REPLACE CPG ENG-RTR INDICATOR.
TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN:
GS245-C AND P73-9
GS245-D AND P73-10
GS255-A AND P73-11
REPAIR OPEN WIRE.
GO TO PARA 8-2-1
NO
CHECK FOR OPEN BETWEEN:
P73-7 AND P400-26
P73-8 AND P400-32
P73-13 AND P400-10
P73-14 AND P400-2
DOES OPEN EXIST?
NO
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
WITH TEST SWITCH ON CPG SDC PANEL DEPRESSED, CHECK FOR OPEN BETWEEN GROUND AND P73-17.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN P73-SP1 AND P73-17.
GO TO PARA 8-2-1.
NO
REPLACE CPG ENG-RTR INDICATOR.
TM 55-1520-238-23.

END OF TASK

8-2-36. ALL CPG DIGITAL READOUTS REMAIN LIGHTED - CPG DGT OFF/NORM/TST SWITCH SET TO DGT OFF

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

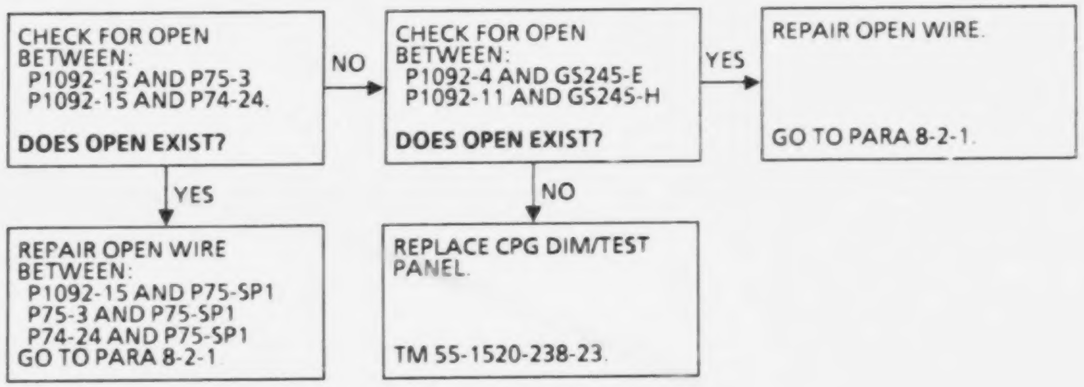
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


CHECK FOR OPEN BETWEEN:
P1092-15 AND P75-3
P1092-15 AND P74-24.
DOES OPEN EXIST?
NO
CHECK FOR OPEN BETWEEN:
P1092-4 AND GS245-E
P1092-11 AND GS245-H
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
YES
REPAIR OPEN WIRE BETWEEN:
P1092-15 AND P75-SP1
P75-3 AND P75-SP1
P74-24 AND P75-SP1
GO TO PARA 8-2-1.
NO
REPLACE CPG DIM/TEST PANEL.
TM 55-1520-238-23.

END OF TASK

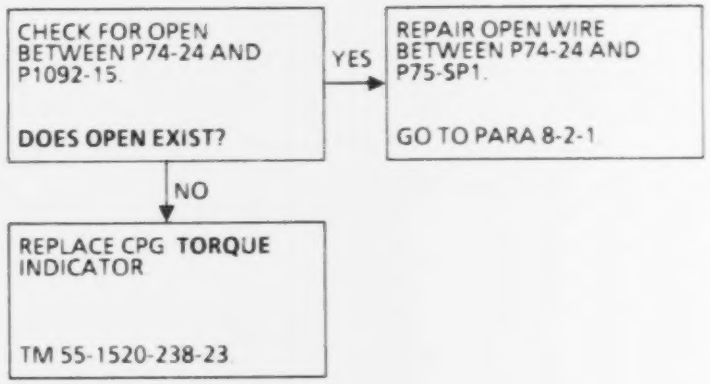
8-2-37. CPG TORQUE INDICATOR DIGITAL READOUTS - DO NOT BLANK

Tools: (para 8-2-36)

Personnel Required: (para 8-2-36)

References: (para 8-2-36)

Equipment Conditions: (para 8-2-36)


CHECK FOR OPEN BETWEEN P74-24 AND P1092-15.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE BETWEEN P74-24 AND P75-SP1.
GO TO PARA 8-2-1.
NO
REPLACE CPG TORQUE INDICATOR
TM 55-1520-238-23

END OF TASK

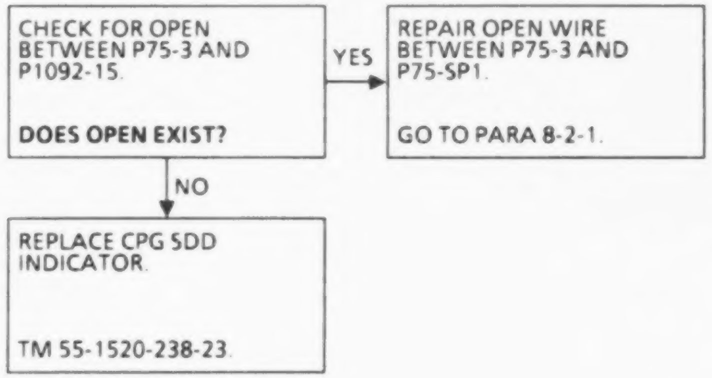
8-2-38. CPG SDD DIGITAL READOUTS - DO NOT BLANK (CPG DIM/TEST PANEL INSTALLED)

Tools: (para 8-2-36)

Personnel Required: (para 8-2-36)

References: (para 8-2-36)

Equipment Conditions: (para 8-2-36)


CHECK FOR OPEN BETWEEN P75-3 AND P1092-15.

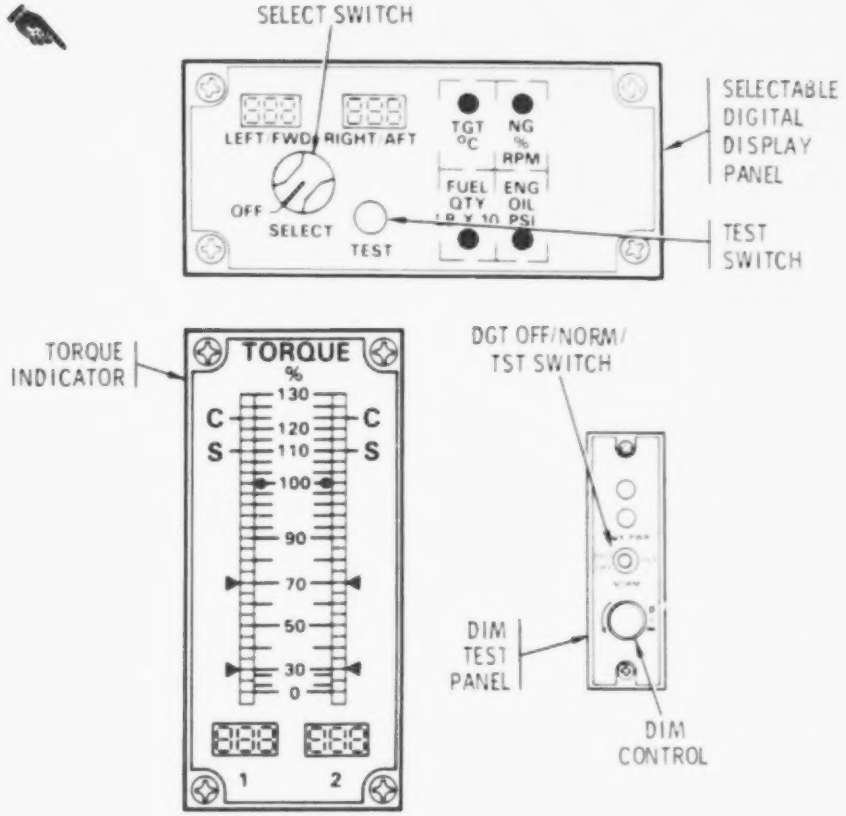
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE BETWEEN P75-3 AND P75-SP1.

GO TO PARA 8-2-1.

NO: REPLACE CPG SDD INDICATOR.

TM 55-1520-238-23.


SELECT SWITCH
SELECTABLE DIGITAL DISPLAY PANEL
LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST
TEST SWITCH
TORQUE INDICATOR
TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
1
2
DGT OFF/NORM/TST SWITCH
DIM TEST PANEL
DIM CONTROL

MM04/1-1438

END OF TASK

8-2-39. CPG ENGINE INSTRUMENT VERTICAL DISPLAYS AND DIGITAL READOUTS - BRIGHTNESS DOES NOT CHANGE WHEN MANUAL DIM CONTROL IS ROTATED (WITH CPG DIM/TEST PANEL INSTALLED)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

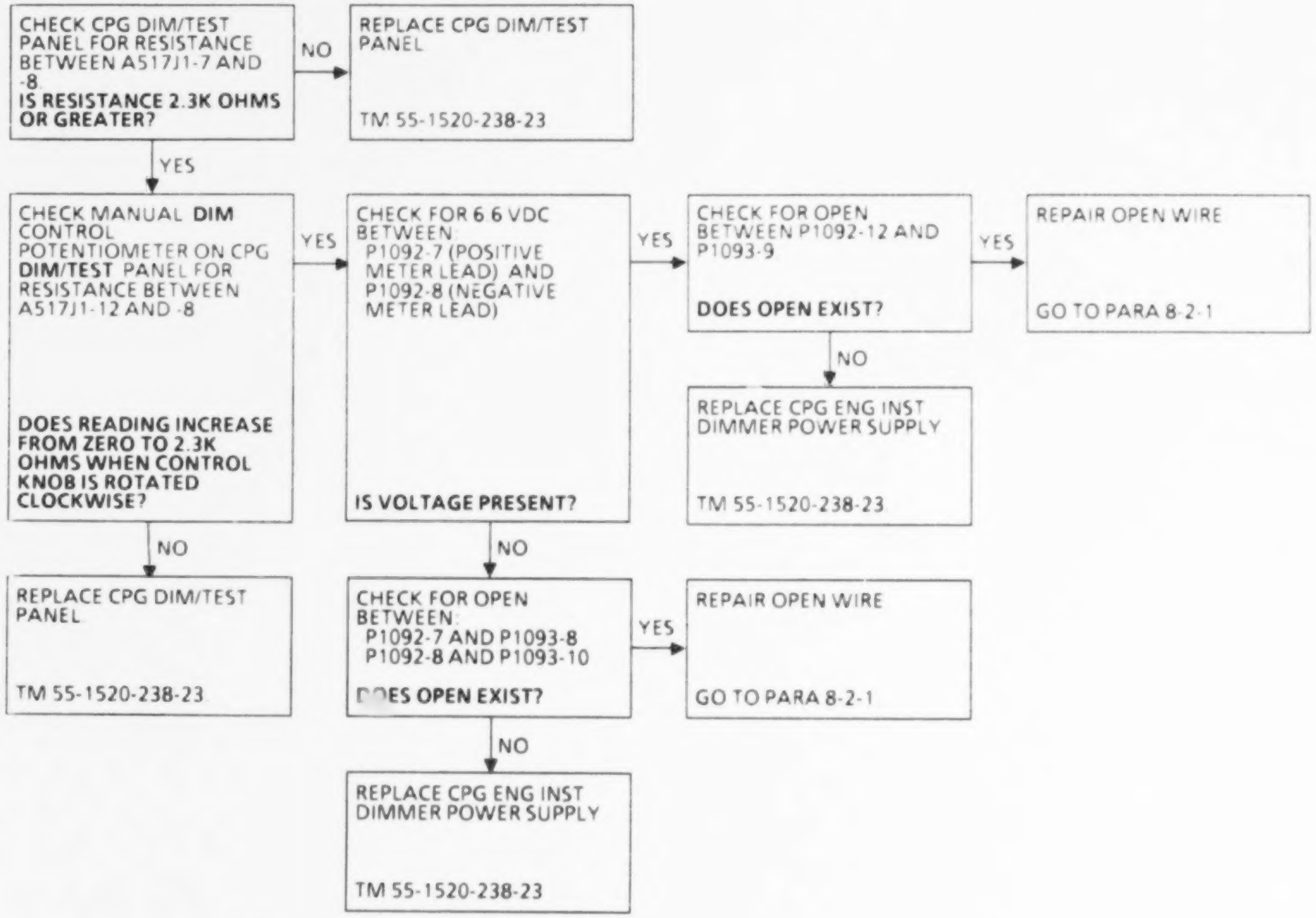
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK CPG DIM/TEST PANEL FOR RESISTANCE BETWEEN A517J1-7 AND -8
IS RESISTANCE 2.3K OHMS OR GREATER?
NO
REPLACE CPG DIM/TEST PANEL
TM 55-1520-238-23
YES
CHECK MANUAL DIM CONTROL POTENTIOMETER ON CPG DIM/TEST PANEL FOR RESISTANCE BETWEEN A517J1-12 AND -8
DOES READING INCREASE FROM ZERO TO 2.3K OHMS WHEN CONTROL KNOB IS ROTATED CLOCKWISE?
YES
CHECK FOR 6.6 VDC BETWEEN: P1092-7 (POSITIVE METER LEAD) AND P1092-8 (NEGATIVE METER LEAD)
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN P1092-12 AND P1093-9
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 8-2-1
NO
REPLACE CPG ENG INST DIMMER POWER SUPPLY
TM 55-1520-238-23
NO
REPLACE CPG DIM/TEST PANEL
TM 55-1520-238-23
NO
CHECK FOR OPEN BETWEEN: P1092-7 AND P1093-8 P1092-8 AND P1093-10
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 8-2-1
NO
REPLACE CPG ENG INST DIMMER POWER SUPPLY
TM 55-1520-238-23

END OF TASK

8-2-40. CPG TORQUE INDICATOR - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8s OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED.

Tools: (para 8-2-39)

Personnel Required: (para 8-2-39)

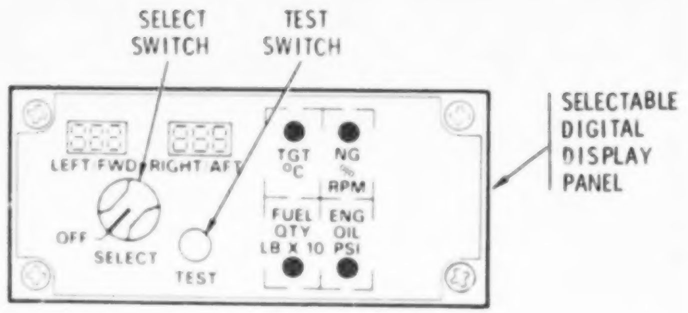
References: (para 8-2-39)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed

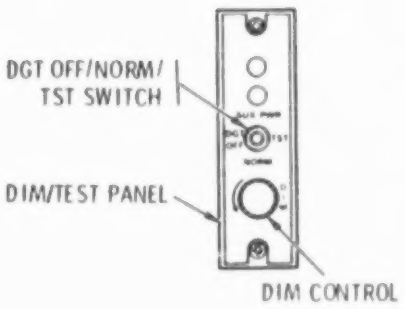
WARNING

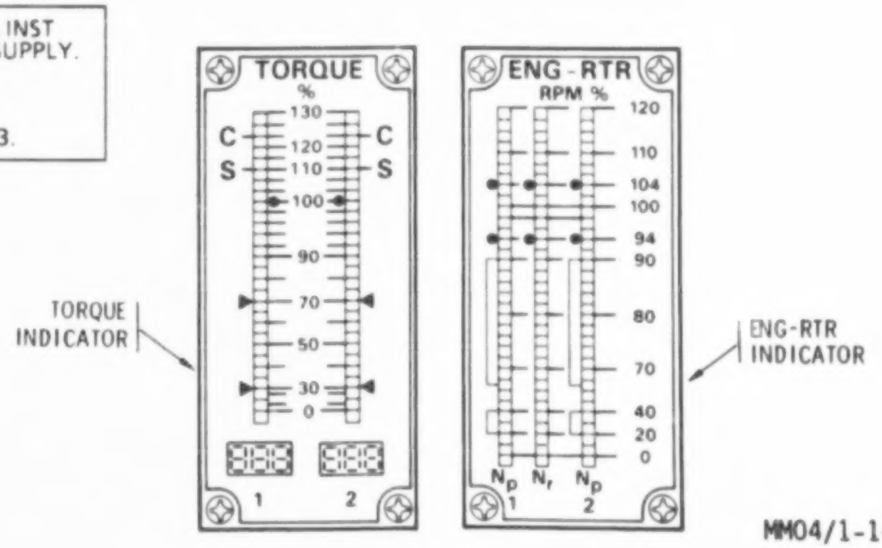
Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


SELECT SWITCH
TEST SWITCH
SELECTABLE DIGITAL DISPLAY PANEL
LEFT FWD
RIGHT AFT
OFF
SELECT
TEST
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI

ON CPG DIM/TEST PANEL, HOLD **DET OFF/NORM/TST** SWITCH TO **TST**. CHECK FOR SHORT BETWEEN GROUND AND P74-17. **DOES SHORT EXIST?**

- YES: CHECK FOR 2 TO 5 VDC AT P74-7 AND -8. **IS VOLTAGE PRESENT?**
  - NO: CHECK FOR OPEN BETWEEN: P74-7 AND P1093-3; P74-8 AND P1093-6. **DOES OPEN EXIST?**
    - YES: REPAIR OPEN WIRE. GO TO PARA 8-2-1.
    - NO: CHECK FOR SHORT BETWEEN GROUND AND P74-7 and P1093-3; P74-8 and P1093-6. **DOES SHORT EXIST?**
      - YES: REPAIR SHORTED WIRE. GO TO PARA 8-2-1.
      - NO: REPLACE CPG ENG INST DIMMER POWER SUPPLY. TM 55-1520-238-23.
  - YES: CHECK FOR: 5 VDC AT P74-12; -8 VDC AT P74-13; 8 VDC AT P74-14. **ARE VOLTAGES PRESENT?**
    - NO: CHECK FOR OPEN BETWEEN: P74-12 AND P401-20; P74-13 AND P401-9; P74-14 AND P401-1. **DOES OPEN EXIST?**
      - YES: REPAIR OPEN WIRE. GO TO PARA 8-2-1.
      - NO: REPLACE SIGNAL DATA CONVERTER. TM 55-1520-238-23.
    - YES: CHECK FOR OPEN BETWEEN: P74-9 AND GS245-A; P74-10 AND GS245-B; P74-11 AND GS255-C. **DOES OPEN EXIST?**
      - YES: REPAIR OPEN WIRE. GO TO PARA 8-2-1.
      - NO: REPLACE CPG **TORQUE** INDICATOR. TM 55-1520-238-23.
- NO: REPAIR OPEN WIRE BETWEEN: P74-17 AND P73-SP1. GO TO PARA 8-2-1.


DGT OFF/NORM/ TST SWITCH
DIM/TEST PANEL
DIM CONTROL


TORQUE INDICATOR
TORQUE %
C
S
130
120
110
100
90
70
50
30
0
1
2
ENG - RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2
ENG-RTR INDICATOR

MM04/1-1439

CPG ENGINE INSTRUMENTS

END OF TASK

8-2-41. CPG ENG-RTR - DOES NOT INDICATE FULL SCALE OR VERTICAL DISPLAY SCALES HAVE EVERY OTHER LAMP NOT LIGHTED. (HELICOPTERS WITH CPG DIM/TEST PANEL INSTALLED)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

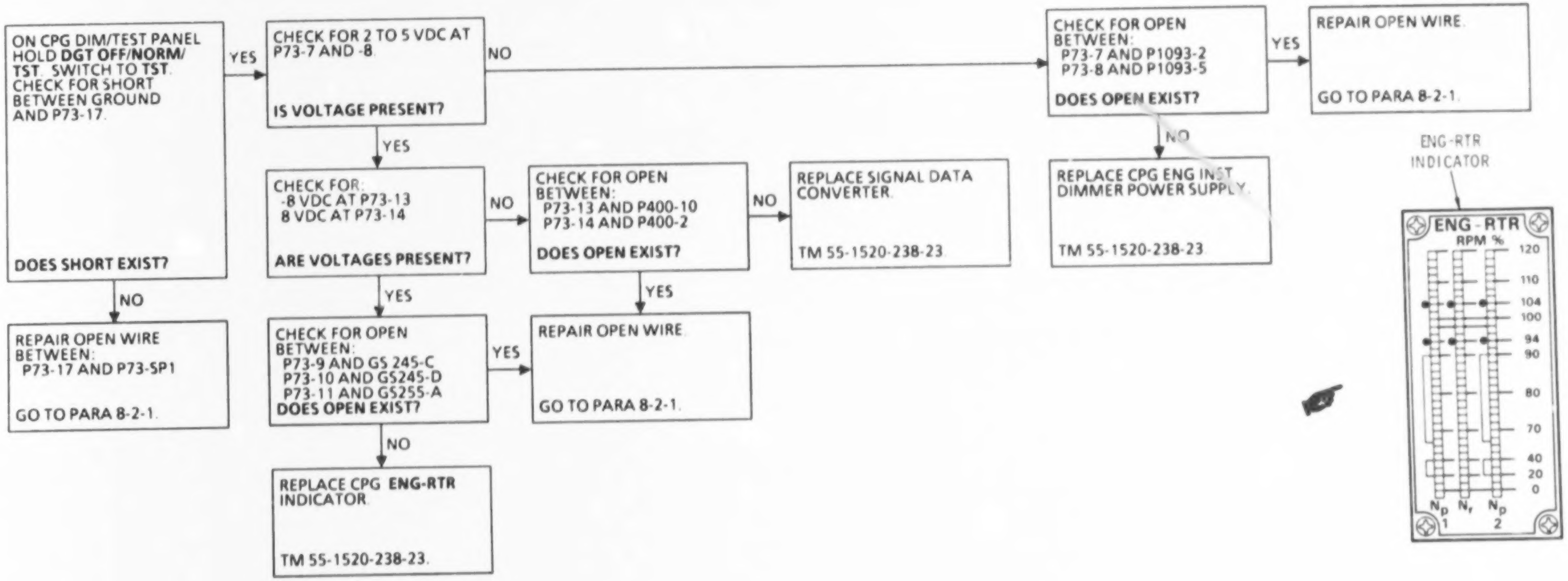
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON CPG DIM/TEST PANEL HOLD DGT OFF/NORM/TST SWITCH TO TST. CHECK FOR SHORT BETWEEN GROUND AND P73-17.
DOES SHORT EXIST?
YES
NO
REPAIR OPEN WIRE BETWEEN: P73-17 AND P73-SP1
GO TO PARA 8-2-1.
CHECK FOR 2 TO 5 VDC AT P73-7 AND -8
IS VOLTAGE PRESENT?
NO
YES
CHECK FOR OPEN BETWEEN: P73-7 AND P1093-2 P73-8 AND P1093-5
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
REPLACE CPG ENG INST DIMMER POWER SUPPLY.
TM 55-1520-238-23.
CHECK FOR: -8 VDC AT P73-13 8 VDC AT P73-14
ARE VOLTAGES PRESENT?
NO
CHECK FOR OPEN BETWEEN: P73-13 AND P400-10 P73-14 AND P400-2
DOES OPEN EXIST?
NO
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
YES
CHECK FOR OPEN BETWEEN: P73-9 AND GS 245-C P73-10 AND GS245-D P73-11 AND GS255-A
DOES OPEN EXIST?
YES
NO
REPLACE CPG ENG-RTR INDICATOR.
TM 55-1520-238-23.
ENG-RTR INDICATOR
ENG - RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
Np 1
Nr
Np 2

MM04/1-1440

END OF TASK

8-2-42. CPG SDD PANEL - DOES NOT INDICATE FULL SCALE OR SHOW ALL DIGITAL 8s (HELICOPTERS WITH CPG DIM/TEST PANEL INSTALLED)

Tools: (para 8-2-41)

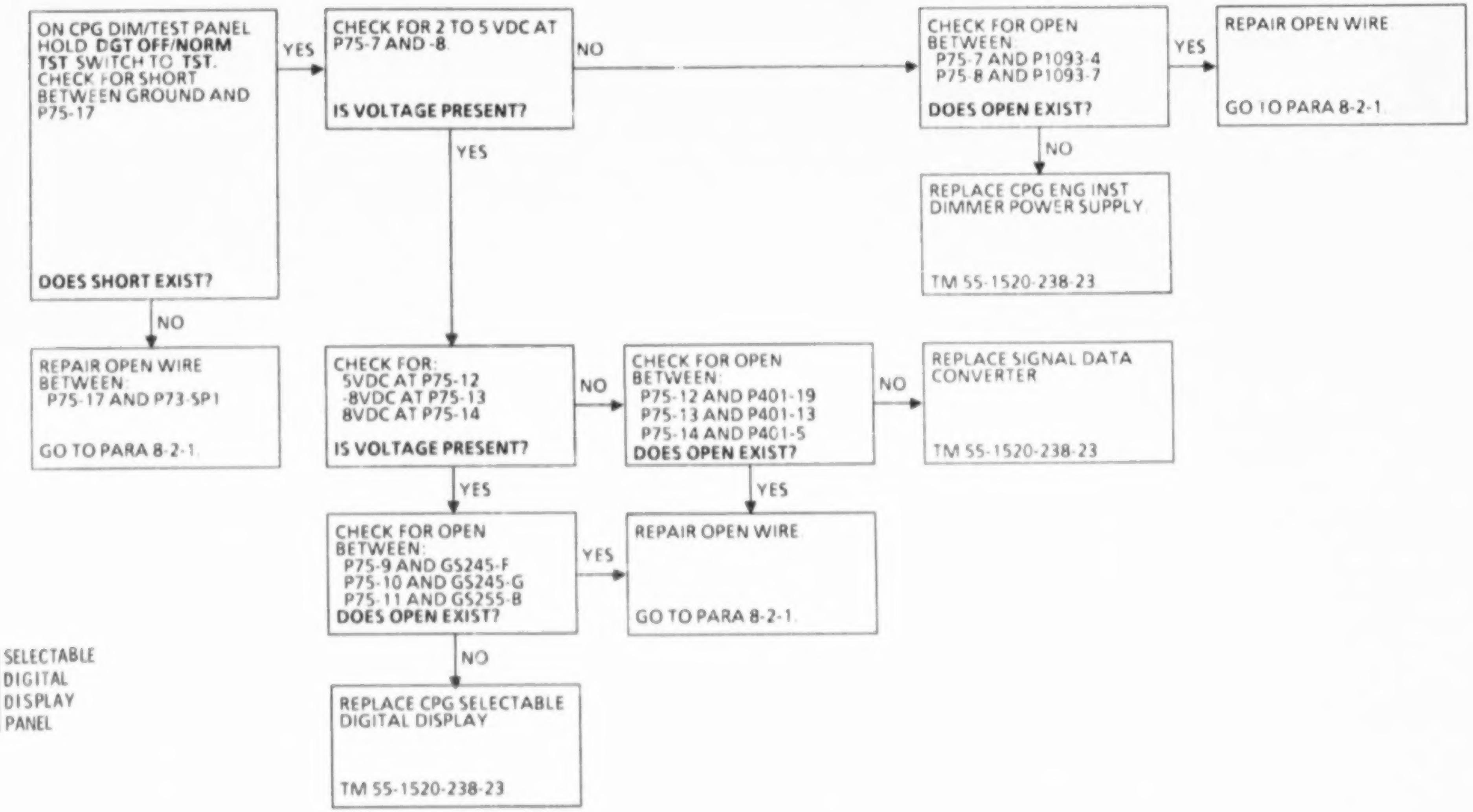
Personnel Required: (para 8-2-41)

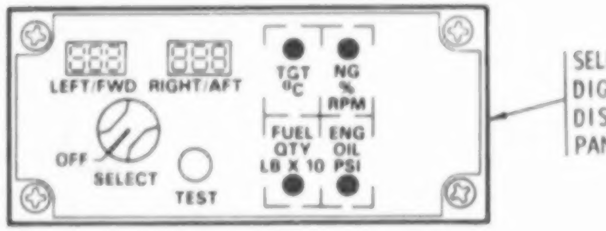
References: (para 8-2-41)

Equipment Conditions: (para 8-2-41)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON CPG DIM/TEST PANEL HOLD DGT OFF/NORM TST SWITCH TO TST. CHECK FOR SHORT BETWEEN GROUND AND P75-17
DOES SHORT EXIST?
YES
NO
REPAIR OPEN WIRE BETWEEN: P75-17 AND P73-SP1
GO TO PARA 8-2-1.
CHECK FOR 2 TO 5 VDC AT P75-7 AND -8.
IS VOLTAGE PRESENT?
NO
YES
CHECK FOR OPEN BETWEEN: P75-7 AND P1093-4 P75-8 AND P1093-7
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 8-2-1.
NO
REPLACE CPG ENG INST DIMMER POWER SUPPLY.
TM 55-1520-238-23
CHECK FOR: 5VDC AT P75-12 -8VDC AT P75-13 8VDC AT P75-14
IS VOLTAGE PRESENT?
NO
CHECK FOR OPEN BETWEEN: P75-12 AND P401-19 P75-13 AND P401-13 P75-14 AND P401-5
DOES OPEN EXIST?
NO
REPLACE SIGNAL DATA CONVERTER
TM 55-1520-238-23
YES
REPAIR OPEN WIRE
GO TO PARA 8-2-1.
YES
CHECK FOR OPEN BETWEEN: P75-9 AND GS245-F P75-10 AND GS245-G P75-11 AND GS255-B
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 8-2-1.
NO
REPLACE CPG SELECTABLE DIGITAL DISPLAY
TM 55-1520-238-23


LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST
SELECTABLE DIGITAL DISPLAY PANEL

MM04/1-1441

END OF TASK

8-2-43. ALL CPG ENGINE INSTRUMENT VERTICAL AND DIGITAL DISPLAYS ARE BLANK (WITH CPG DIM/TEST PANEL INSTALLED)

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

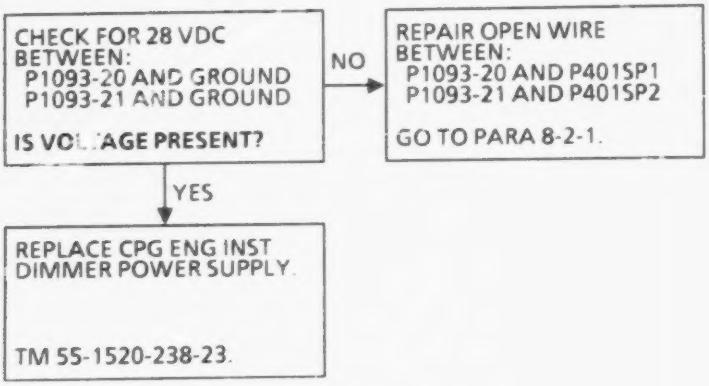
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR 28 VDC BETWEEN:
P1093-20 AND GROUND
P1093-21 AND GROUND

IS VOLTAGE PRESENT?

NO: REPAIR OPEN WIRE BETWEEN:
P1093-20 AND P401SP1
P1093-21 AND P401SP2

GO TO PARA 8-2-1.

YES: REPLACE CPG ENG INST DIMMER POWER SUPPLY.

TM 55-1520-238-23.

END OF TASK

8-2-44. ALL CPG ENGINE INSTRUMENTS BLANK WITH DGT OFF/NORM/TST SWITCH AT NORM (HELICOPTERS WITH CPG DIM/TEST PANEL INSTALLED)

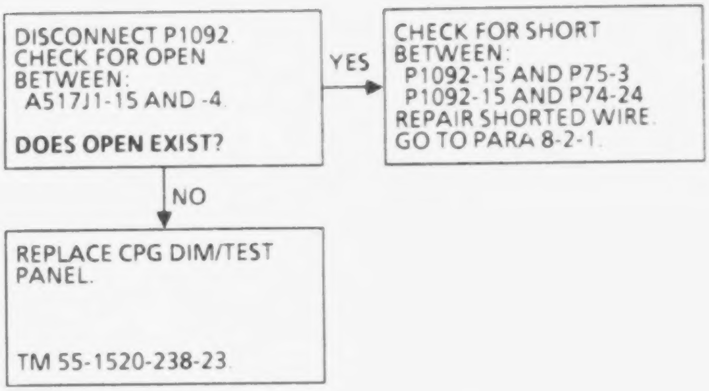
Tools: (para 8-2-43)

Personnel Required: (para 8-2-43)

References: (para 8-2-43)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



DISCONNECT P1092.
CHECK FOR OPEN BETWEEN:
A517J1-15 AND -4.

DOES OPEN EXIST?

CHECK FOR SHORT BETWEEN:
P1092-15 AND P75-3
P1092-15 AND P74-24
REPAIR SHORTED WIRE.
GO TO PARA 8-2-1.

REPLACE CPG DIM/TEST PANEL.

TM 55-1520-238-23.

END OF TASK

8-2-45. CPG SDD PANEL ENGINE INSTRUMENT INDICATORS - ARE NOT BLANKED OUT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

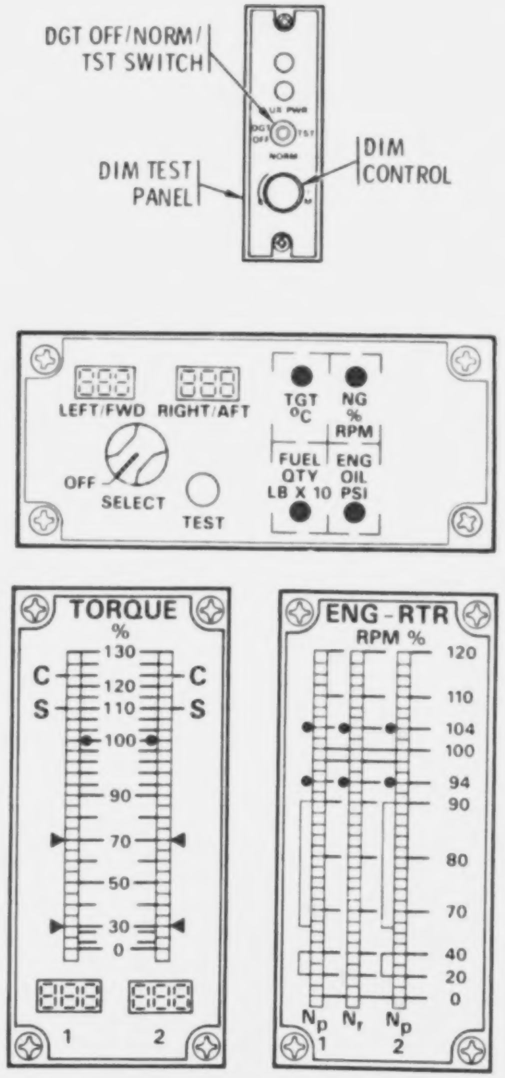
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


DGT OFF/NORM/
TST SWITCH
DIM TEST
PANEL
DIM
CONTROL
LEFT/FWD
RIGHT/AFT
OFF
SELECT
TEST
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
1
2
ENG-RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
N_p 1
N_r
N_p 2

CPG ENGINE INSTRUMENTS

MM04/1-1341A

CHECK CPG **TORQUE** AND **ENG-RTR** INDICATOR VERTICAL DISPLAYS.
DO DISPLAYS SHOW FULL SCALE?

YES → CHECK FOR SHORT BETWEEN GROUND AND: P75-17, P74-17, P73-17, P73-SP1.
REPAIR SHORTED WIRE.
GO TO PARA 8-2-1.

NO → REPLACE CPG SDD PANEL.
TM 55-1520-238-23.

END OF TASK

8-2-46. CPG TORQUE INDICATOR DIGITAL READOUTS - ARE NOT BLANKED OUT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

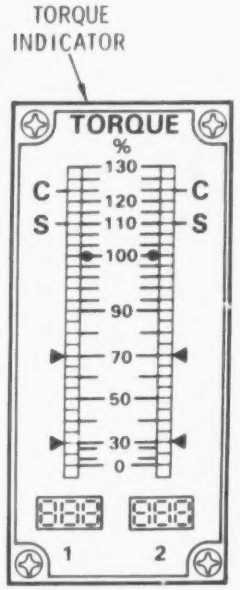
68F10 Aircraft Electrician

References:

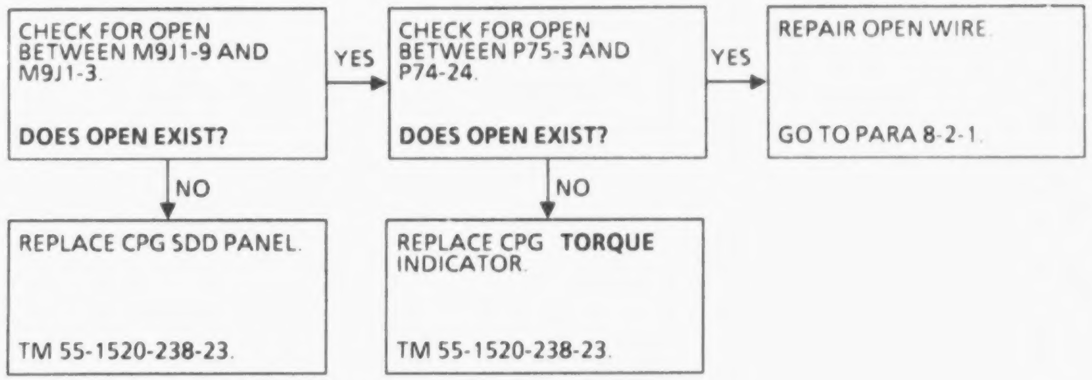
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


TORQUE INDICATOR
TORQUE
%
130
120
110
100
90
70
50
30
0
C
S
C
S
1
2

MM04/1-1443


CHECK FOR OPEN BETWEEN M9J1-9 AND M9J1-3.
DOES OPEN EXIST?
YES
NO
REPLACE CPG SDD PANEL.
TM 55-1520-238-23.
CHECK FOR OPEN BETWEEN P75-3 AND P74-24.
DOES OPEN EXIST?
YES
NO
REPLACE CPG TORQUE INDICATOR.
TM 55-1520-238-23.
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

END OF TASK

8-2-47. CPG SDD PANEL TGT DIGITAL READOUTS - DO NOT INDICATE AMBIENT TEMPERATURE ±5 DEGREES

Tools: (para 8-2-46)

Personnel Required: (para 8-2-46)

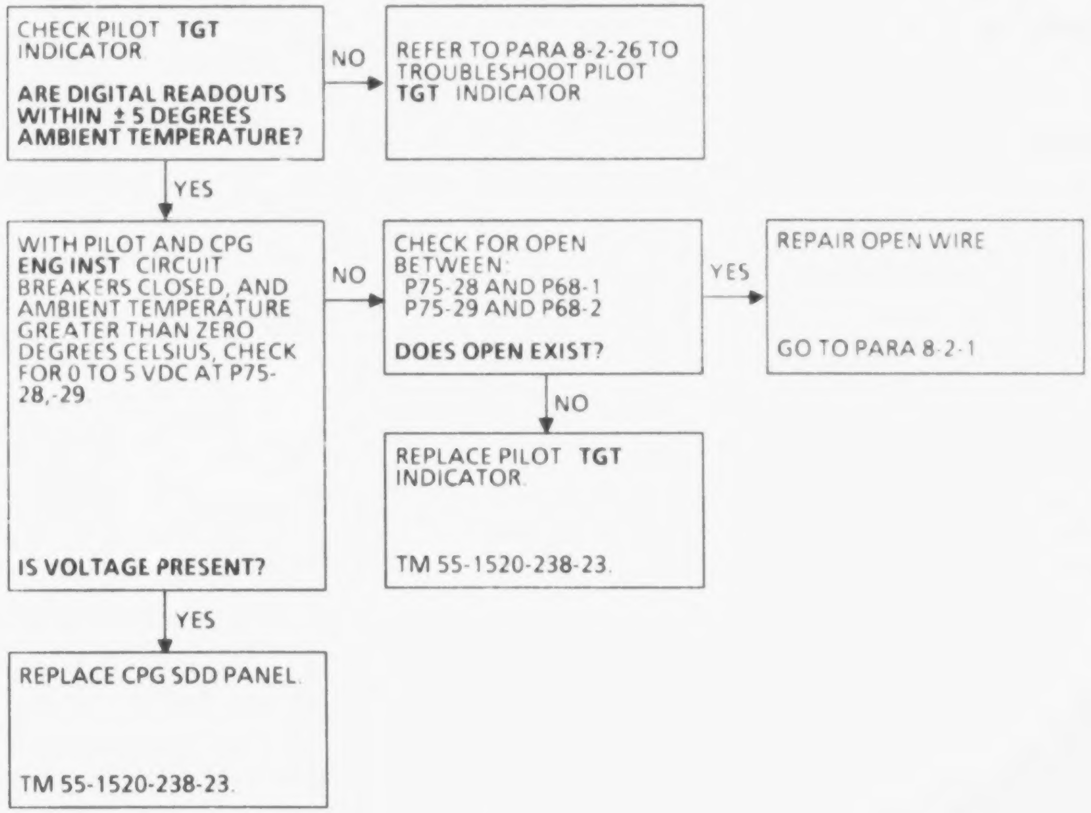
References: (para 8-2-46)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK PILOT TGT INDICATOR
ARE DIGITAL READOUTS WITHIN ± 5 DEGREES AMBIENT TEMPERATURE?
NO
REFER TO PARA 8-2-26 TO TROUBLESHOOT PILOT TGT INDICATOR
YES
WITH PILOT AND CPG ENG INST CIRCUIT BREAKERS CLOSED, AND AMBIENT TEMPERATURE GREATER THAN ZERO DEGREES CELSIUS, CHECK FOR 0 TO 5 VDC AT P75-28,-29
IS VOLTAGE PRESENT?
NO
CHECK FOR OPEN BETWEEN: P75-28 AND P68-1 P75-29 AND P68-2
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 8-2-1
NO
REPLACE PILOT TGT INDICATOR.
TM 55-1520-238-23.
YES
REPLACE CPG SDD PANEL.
TM 55-1520-238-23.

END OF TASK

8-2-48. CPG SDD PANEL N_G DIGITAL READOUTS - DO NOT INDICATE ZERO TO ONE-HALF PERCENT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

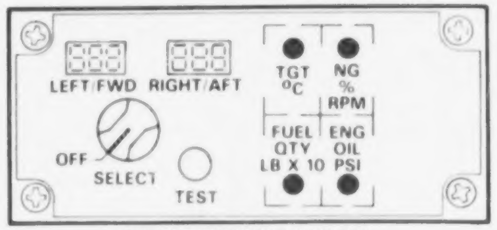
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

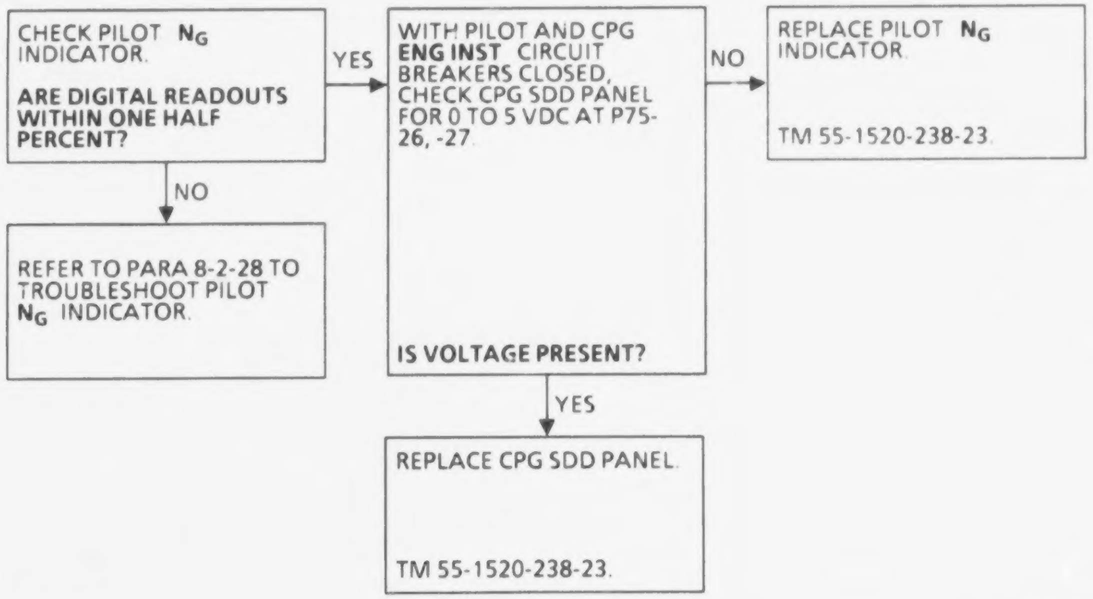

LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST

CPG SELECTABLE DIGITAL DISPLAY PANEL

MM04/1-1070

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK PILOT NG INDICATOR. ARE DIGITAL READOUTS WITHIN ONE HALF PERCENT?
YES
NO
REFER TO PARA 8-2-28 TO TROUBLESHOOT PILOT NG INDICATOR.
WITH PILOT AND CPG ENG INST CIRCUIT BREAKERS CLOSED, CHECK CPG SDD PANEL FOR 0 TO 5 VDC AT P75-26, -27. IS VOLTAGE PRESENT?
NO
REPLACE PILOT NG INDICATOR. TM 55-1520-238-23.
YES
REPLACE CPG SDD PANEL. TM 55-1520-238-23.

END OF TASK

8-2-49. CPG SDD PANEL FUEL QTY LBX10 DIGITAL READOUTS - DO NOT INDICATE EXISTING FUEL ±20 POUNDS

Tools: (para 8-2-48)

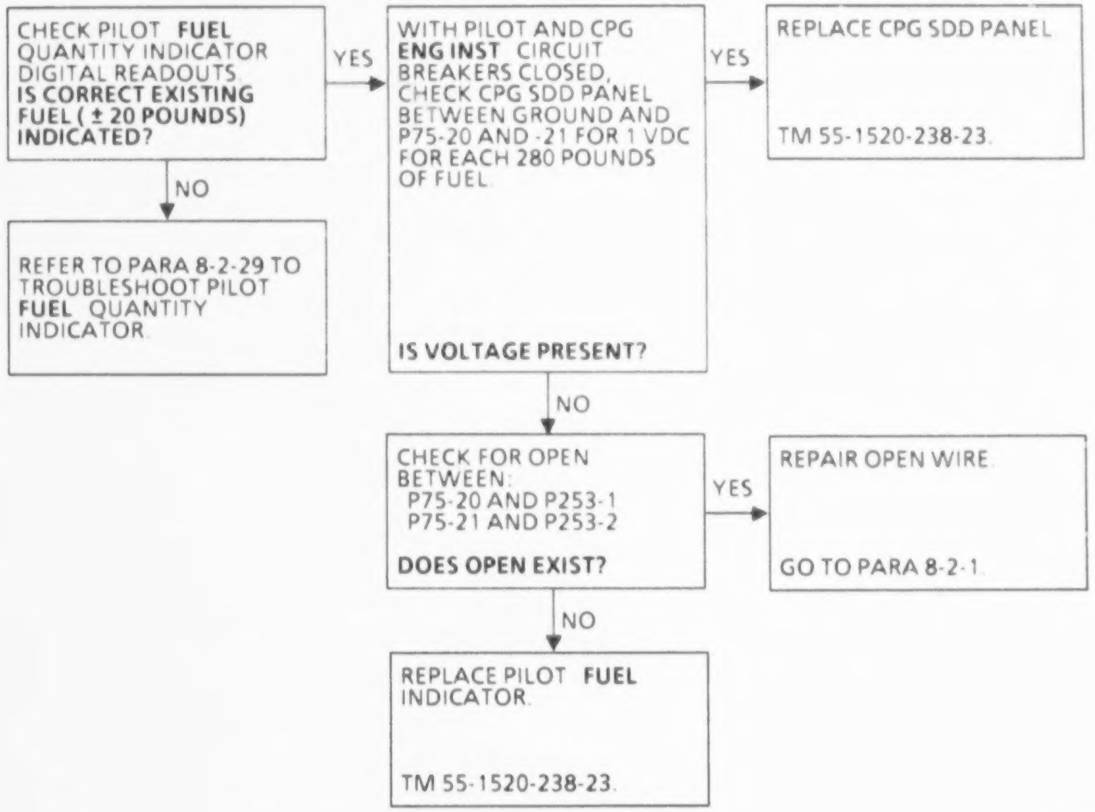
Personnel Required: (para 8-2-48)

References: (para 8-2-48)

Equipment Conditions: (para 8-2-48)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK PILOT FUEL QUANTITY INDICATOR DIGITAL READOUTS. IS CORRECT EXISTING FUEL (± 20 POUNDS) INDICATED?
YES
NO
REFER TO PARA 8-2-29 TO TROUBLESHOOT PILOT FUEL QUANTITY INDICATOR.
WITH PILOT AND CPG ENG INST CIRCUIT BREAKERS CLOSED, CHECK CPG SDD PANEL BETWEEN GROUND AND P75-20 AND -21 FOR 1 VDC FOR EACH 280 POUNDS OF FUEL. IS VOLTAGE PRESENT?
YES
REPLACE CPG SDD PANEL. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P75-20 AND P253-1 P75-21 AND P253-2 DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 8-2-1.
NO
REPLACE PILOT FUEL INDICATOR. TM 55-1520-238-23.

END OF TASK

8-2-50. CPG SDD PANEL ENG OIL DIGITAL READOUTS - DO NOT INDICATE ZERO TO FIVE POUNDS PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

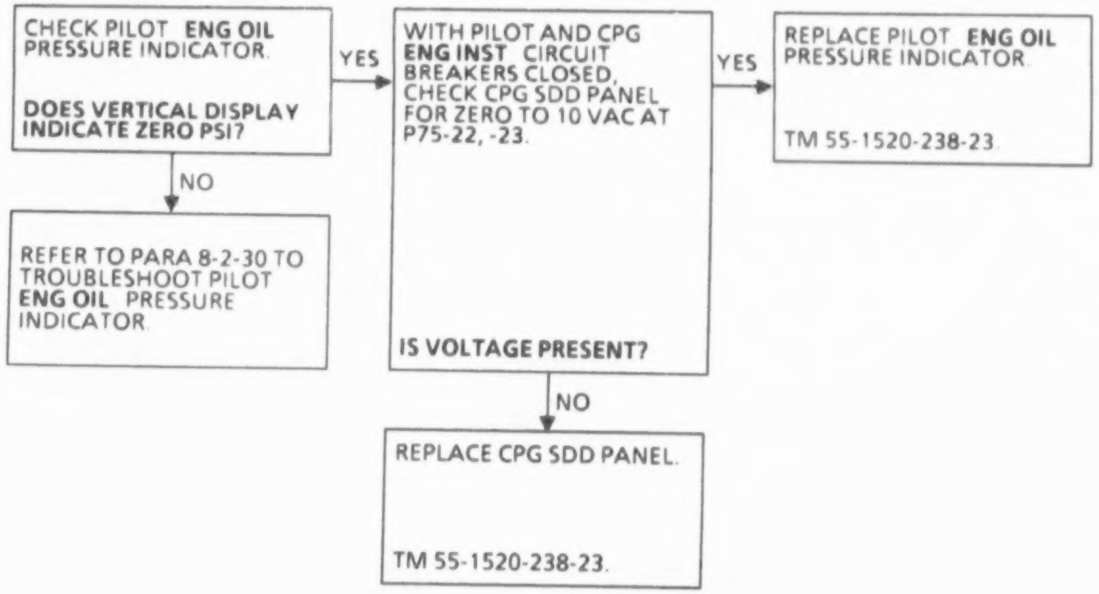
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK PILOT ENG OIL PRESSURE INDICATOR.
DOES VERTICAL DISPLAY INDICATE ZERO PSI?
YES
WITH PILOT AND CPG ENG INST CIRCUIT BREAKERS CLOSED, CHECK CPG SDD PANEL FOR ZERO TO 10 VAC AT P75-22, -23.
IS VOLTAGE PRESENT?
YES
REPLACE PILOT ENG OIL PRESSURE INDICATOR.
TM 55-1520-238-23.
NO
REFER TO PARA 8-2-30 TO TROUBLESHOOT PILOT ENG OIL PRESSURE INDICATOR.
NO
REPLACE CPG SDD PANEL.
TM 55-1520-238-23.

END OF TASK

8-2-51. CPG TORQUE INDICATOR VERTICAL DISPLAY SCALES AND DIGITAL READOUTS - DO NOT INDICATE ZERO TO TWO PERCENT

Tools: (para 8-2-50)

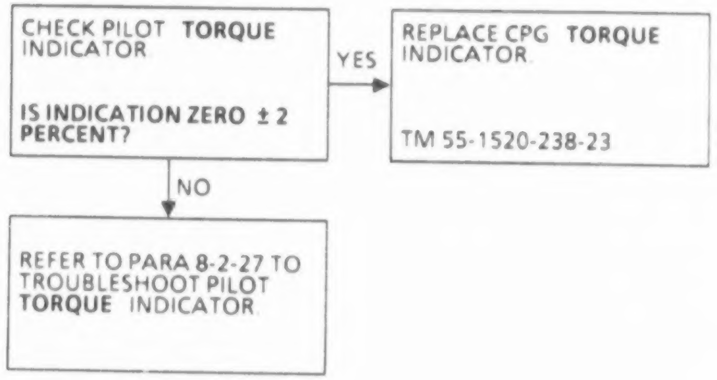
Personnel Required: (para 8-2-50)

References: (para 8-2-50)

Equipment Conditions: (para 8-2-50)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK PILOT TORQUE INDICATOR.
IS INDICATION ZERO ± 2 PERCENT?
YES
REPLACE CPG TORQUE INDICATOR.
TM 55-1520-238-23
NO
REFER TO PARA 8-2-27 TO TROUBLESHOOT PILOT TORQUE INDICATOR.

END OF TASK

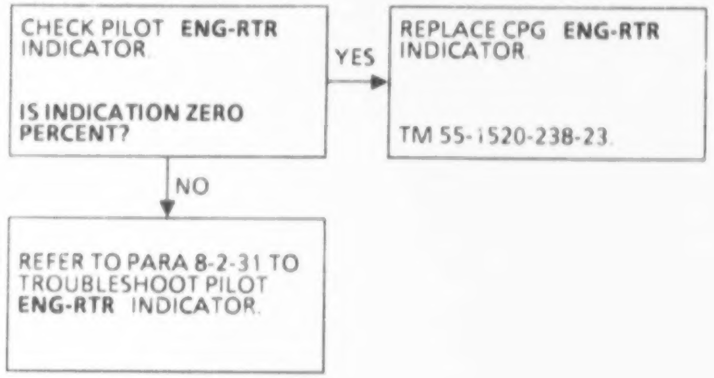
8-2-52. CPG ENG-RTR INDICATOR VERTICAL DISPLAY SCALES - DO NOT INDICATE ZERO PERCENT

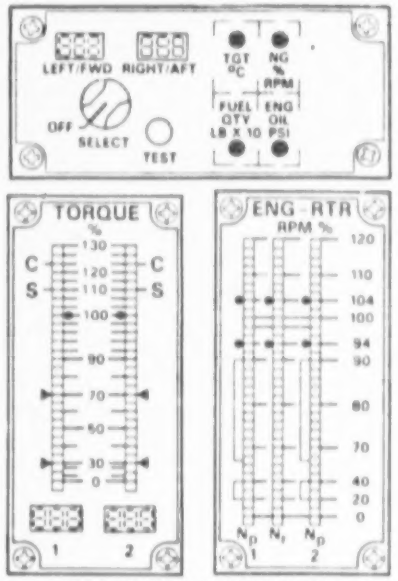
Tools: (para 8-2-50)

Personnel Required: (para 8-2-50)

References: (para 8-2-50)

Equipment Conditions: (para 8-2-50)


CHECK PILOT ENG-RTR INDICATOR
IS INDICATION ZERO PERCENT?
YES
REPLACE CPG ENG-RTR INDICATOR
TM 55-1520-238-23
NO
REFER TO PARA 8-2-31 TO TROUBLESHOOT PILOT ENG-RTR INDICATOR


LEFT/FWD
RIGHT/AFT
OFF
SELECT
TEST
TGT °C
NG %
RPM
FUEL QTY LB X 10
ENG OIL PSI
TORQUE %
C
S
130
120
110
100
90
70
50
30
0
1
2
ENG-RTR RPM %
120
110
104
100
94
90
80
70
40
20
0
N_p
N_r
N_p
1
2

CPG ENGINE INSTRUMENTS

MM04/1-1073

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

END OF TASK

8-2-53. CPG SDD PANEL EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-2-50)

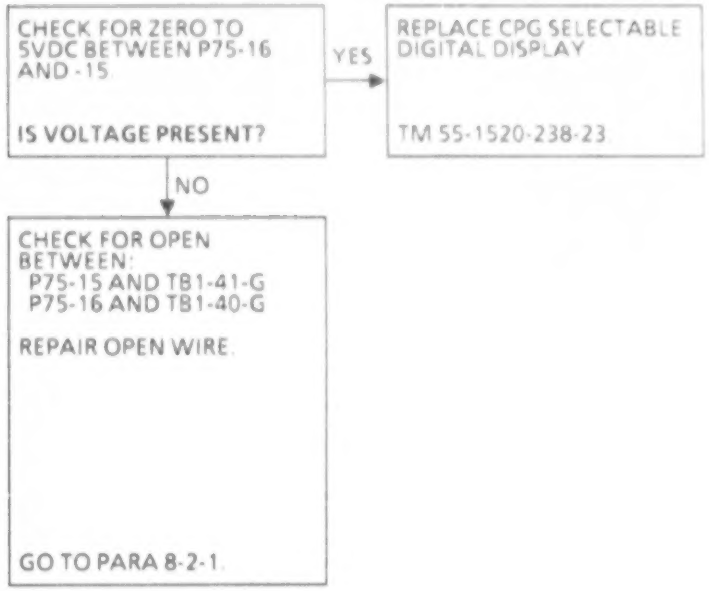
Personnel Required: (para 8-2-50)

References: (para 8-2-50)

Equipment Conditions: (para 8-2-50)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR ZERO TO 5VDC BETWEEN P75-16 AND -15
IS VOLTAGE PRESENT?
YES
REPLACE CPG SELECTABLE DIGITAL DISPLAY
TM 55-1520-238-23
NO
CHECK FOR OPEN BETWEEN:
P75-15 AND TB1-41-G
P75-16 AND TB1-40-G
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

END OF TASK

8-2-54. CPG TORQUE INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.

Personnel Required:

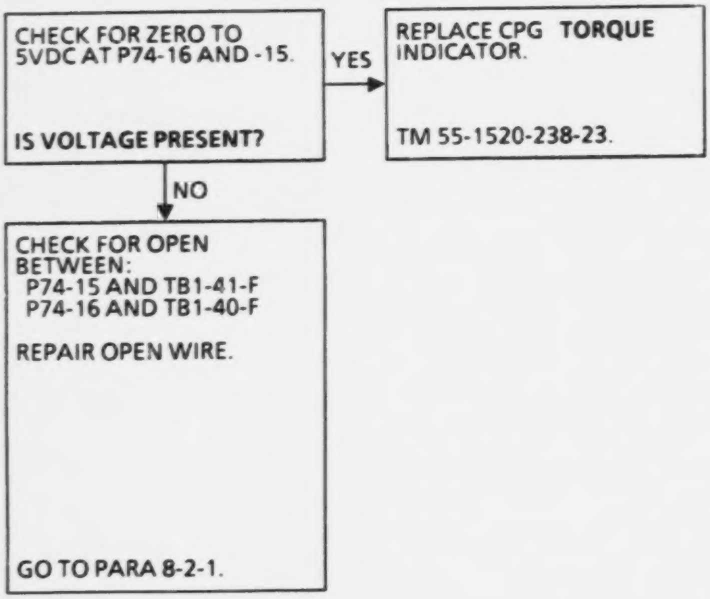
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
Para 8-2-2	External power application - Electrical



CHECK FOR ZERO TO 5VDC AT P74-16 AND -15.

IS VOLTAGE PRESENT?

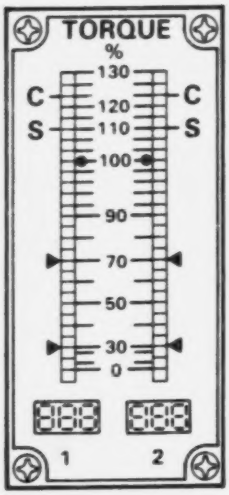
YES: REPLACE CPG **TORQUE** INDICATOR.

TM 55-1520-238-23.

NO: CHECK FOR OPEN BETWEEN:
P74-15 AND TB1-41-F
P74-16 AND TB1-40-F

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.



CPG TORQUE INDICATOR

MM04/1-1088

END OF TASK

8-2-55. CPG ENG-RTR INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-2-54)

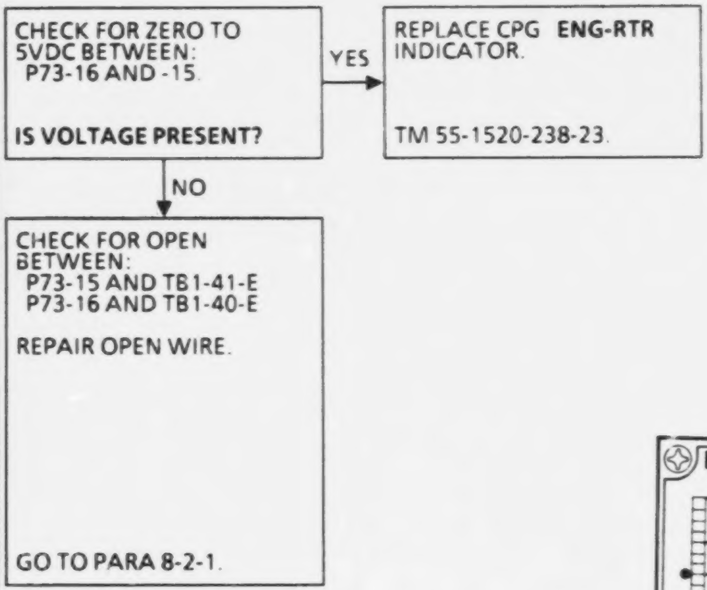
Personnel Required: (para 8-2-54)

References: (para 8-2-54)

Equipment Conditions: (para 8-2-54)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR ZERO TO 5VDC BETWEEN:
P73-16 AND -15.

IS VOLTAGE PRESENT?

YES:

REPLACE CPG ENG-RTR INDICATOR.

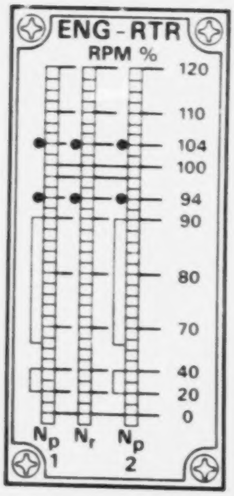
TM 55-1520-238-23.

NO:

CHECK FOR OPEN BETWEEN:
P73-15 AND TB1-41-E
P73-16 AND TB1-40-E

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.



CPG ROTOR RPM INDICATOR

MM04/1-1089

END OF TASK

best copy available

8-2-56. CPG DIM/TEST PANEL EDGE-LIGHTING - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

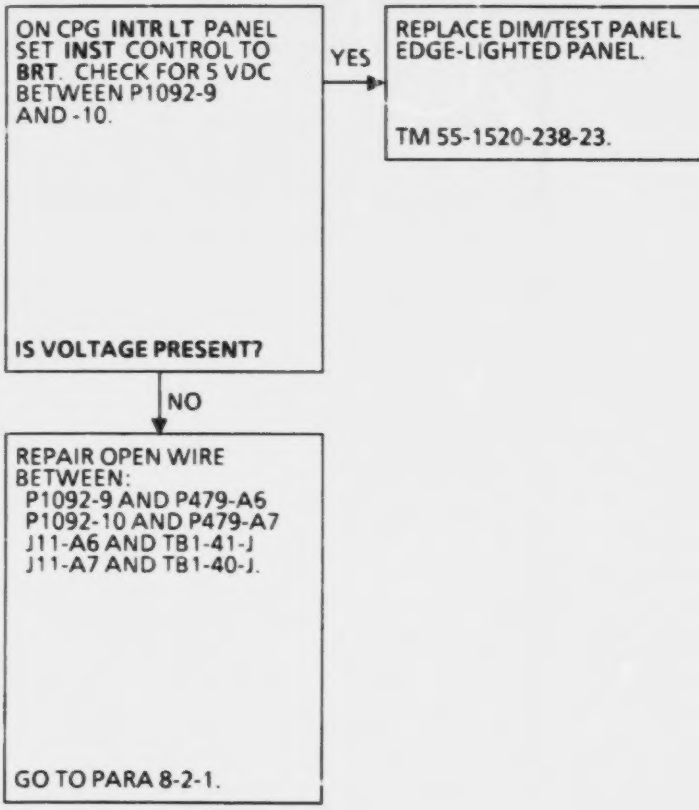
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON CPG **INTR LT** PANEL SET **INST** CONTROL TO **BRT**. CHECK FOR 5 VDC BETWEEN P1092-9 AND -10.

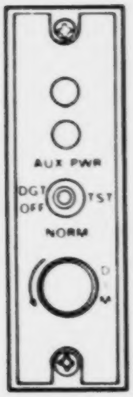
IS VOLTAGE PRESENT?

REPLACE DIM/TEST PANEL EDGE-LIGHTED PANEL.

TM 55-1520-238-23.

REPAIR OPEN WIRE BETWEEN:
P1092-9 AND P479-A6
P1092-10 AND P479-A7
J11-A6 AND TB1-41-J
J11-A7 AND TB1-40-J.

GO TO PARA 8-2-1.


AUX PWR
DGT OFF
TST
NORM
D
M

CPG DIM/TEST PANEL

MM04/1-1416

END OF TASK

8-2-57. PILOT DIM/TEST PANEL EDGE-LIGHTING - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

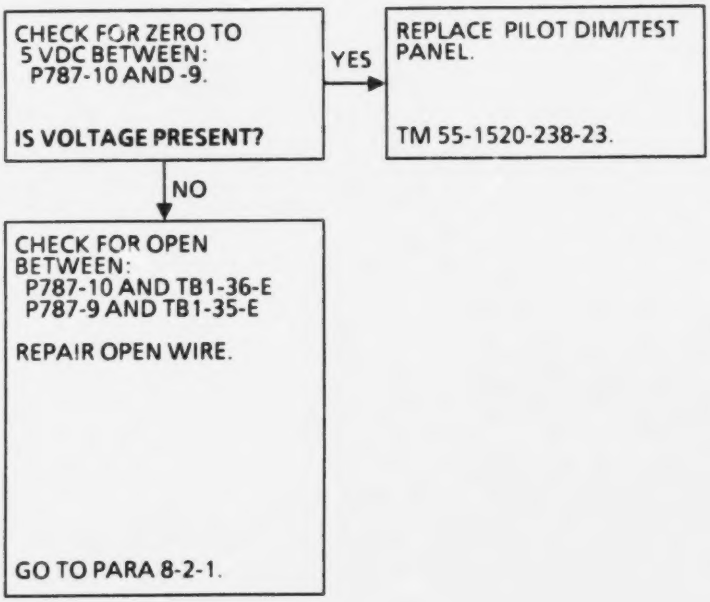
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR ZERO TO 5 VDC BETWEEN:
P787-10 AND -9.

IS VOLTAGE PRESENT?

REPLACE PILOT DIM/TEST PANEL.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P787-10 AND TB1-36-E
P787-9 AND TB1-35-E

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

END OF TASK

8-2-58. PILOT TGT INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-2-57)

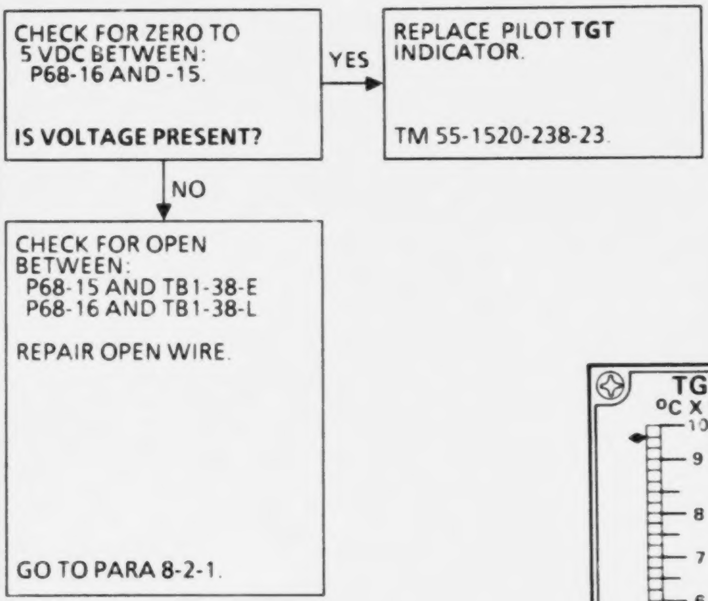
Personnel Required: (para 8-2-57)

References: (para 8-2-57)

Equipment Conditions: (para 8-2-57)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR ZERO TO 5 VDC BETWEEN:
P68-16 AND -15.

IS VOLTAGE PRESENT?

YES

REPLACE PILOT **TGT** INDICATOR.

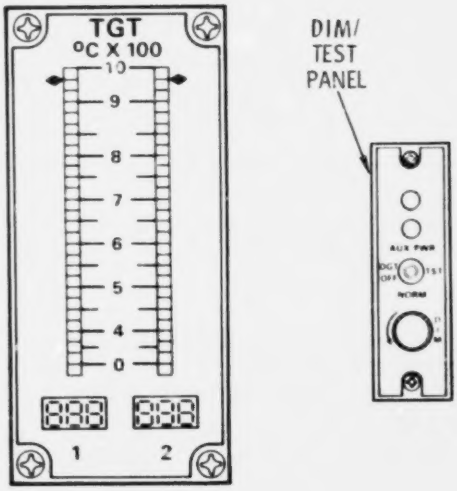
TM 55-1520-238-23.

NO

CHECK FOR OPEN BETWEEN:
P68-15 AND TB1-38-E
P68-16 AND TB1-38-L

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.



TURBINE GAS TEMPERATURE INDICATOR

MM04/1-1090A

END OF TASK

8-2-59. PILOT TORQUE INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-2-57)

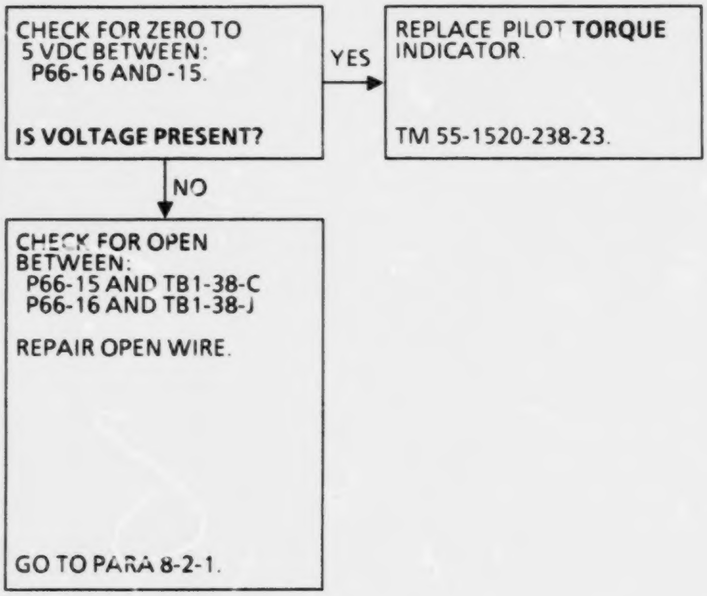
Personnel Required: (para 8-2-57)

References: (para 8-2-57)

Equipment Conditions: (para 8-2-57)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR ZERO TO 5 VDC BETWEEN:
P66-16 AND -15.

IS VOLTAGE PRESENT?

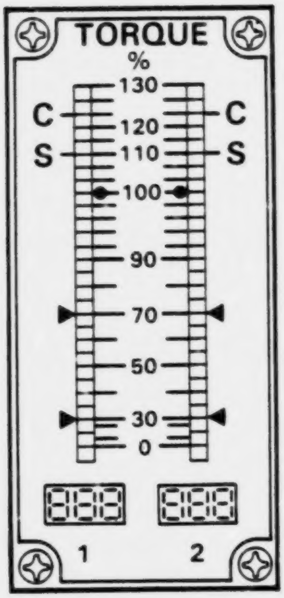
REPLACE PILOT **TORQUE** INDICATOR.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P66-15 AND TB1-38-C
P66-16 AND TB1-38-J

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.



PILOT TORQUE INDICATOR

MM04/1-1092

END OF TASK

8-2-60. PILOT FUEL LBX10 INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-2-57)

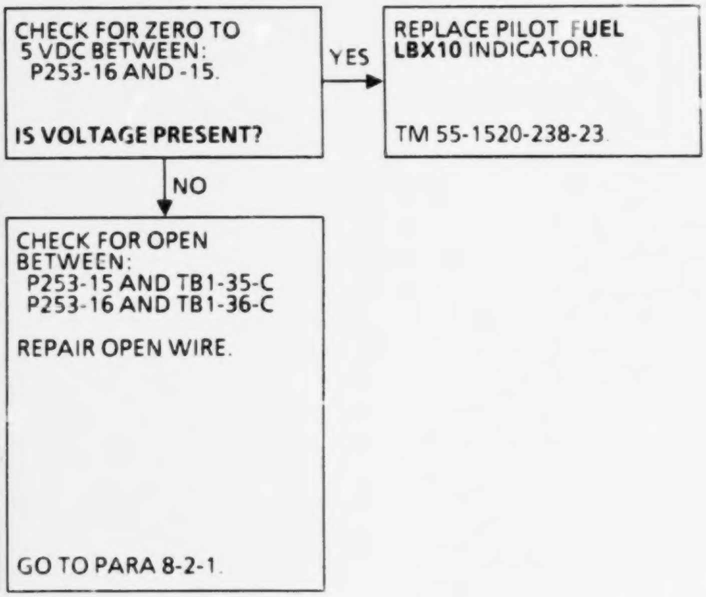
Personnel Required: (para 8-2-57)

References: (para 8-2-57)

Equipment Conditions: (para 8-2-57)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR ZERO TO 5 VDC BETWEEN:
P253-16 AND -15.

IS VOLTAGE PRESENT?

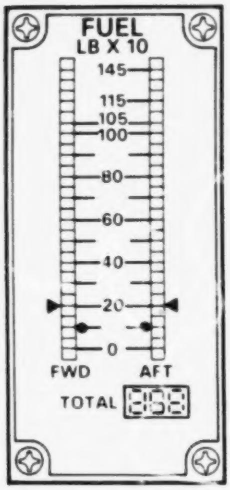
REPLACE PILOT FUEL LBX10 INDICATOR.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P253-15 AND TB1-35-C
P253-16 AND TB1-36-C

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.



FUEL LB X 10 INDICATOR

MM04/1-1091A

END OF TASK

8-2-61. PILOT N_G INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

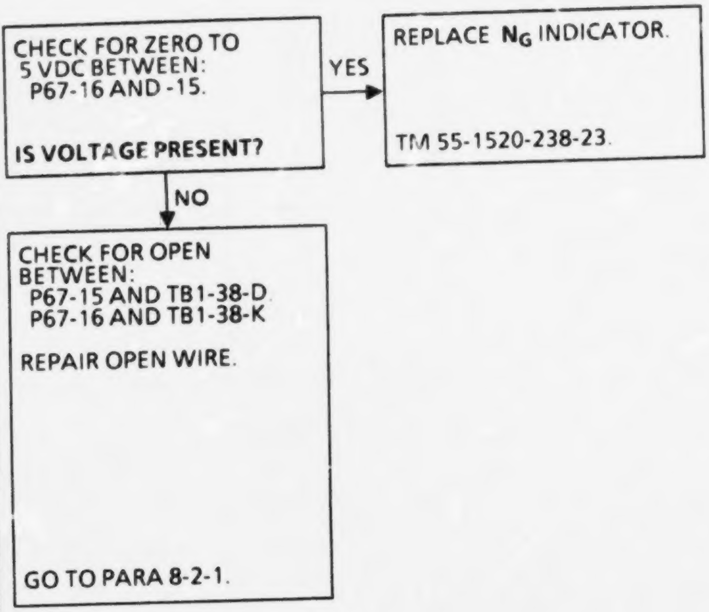
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR ZERO TO 5 VDC BETWEEN:
P67-16 AND -15.

IS VOLTAGE PRESENT?

YES

REPLACE N_G INDICATOR.

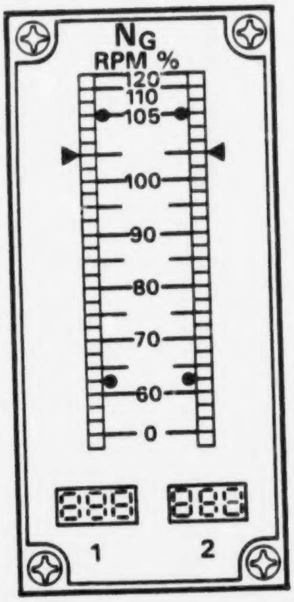
TM 55-1520-238-23.

NO

CHECK FOR OPEN BETWEEN:
P67-15 AND TB1-38-D.
P67-16 AND TB1-38-K.

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.



PILOT N_G INDICATOR

MM04/1-1093

END OF TASK

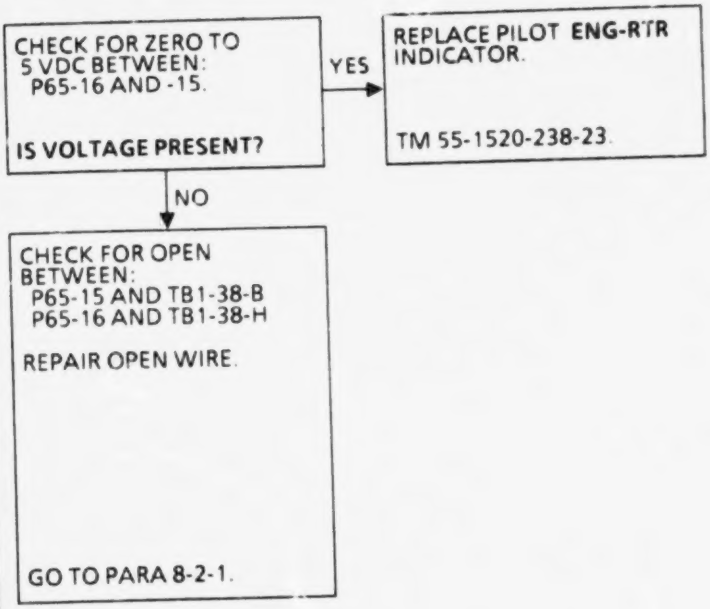
8-2-62. PILOT ENG-RTR INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-2-61)

Personnel Required: (para 8-2-61)

References: (para 8-2-61)

Equipment Conditions: (para 8-2-61)



CHECK FOR ZERO TO 5 VDC BETWEEN:
P65-16 AND -15.

IS VOLTAGE PRESENT?

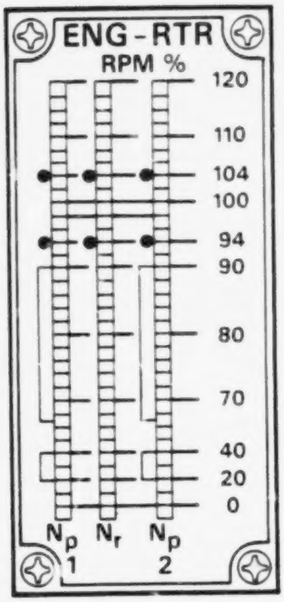
YES → REPLACE PILOT ENG-RTR INDICATOR.

TM 55-1520-238-23.

NO → CHECK FOR OPEN BETWEEN:
P65-15 AND TB1-38-B
P65-16 AND TB1-38-H

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.


ENG-RTR
RPM %
120
110
104
100
94
90
80
70
40
20
0
N_p 1
N_r
N_p 2

PILOT ENG-RTR INDICATOR

MM04/1-1094

END OF TASK

8-2-63. PILOT ENG OIL INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-2-61)

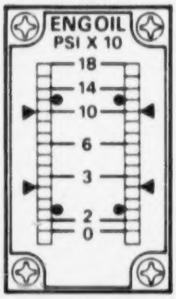
Personnel Required: (para 8-2-61)

References: (para 8-2-61)

Equipment Conditions: (para 8-2-61)

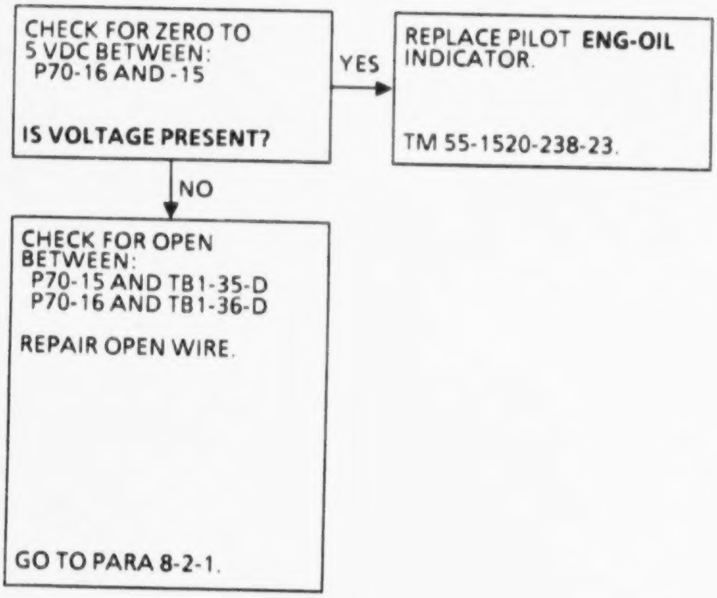
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



PILOT ENG OIL INDICATOR

MM04/1-1095


CHECK FOR ZERO TO 5 VDC BETWEEN:
P70-16 AND -15
IS VOLTAGE PRESENT?
YES
REPLACE PILOT **ENG-OIL** INDICATOR.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN:
P70-15 AND TB1-35-D
P70-16 AND TB1-36-D
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

END OF TASK

8-2-64. PILOT AND CPG ENG OIL INDICATORS - DO NOT INDICATE ENGINE 1 OIL PRESSURE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

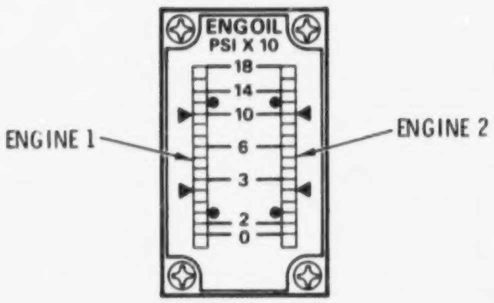
TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical Access provisions - RN1 door opened
Para 1-3-2	ICS connected

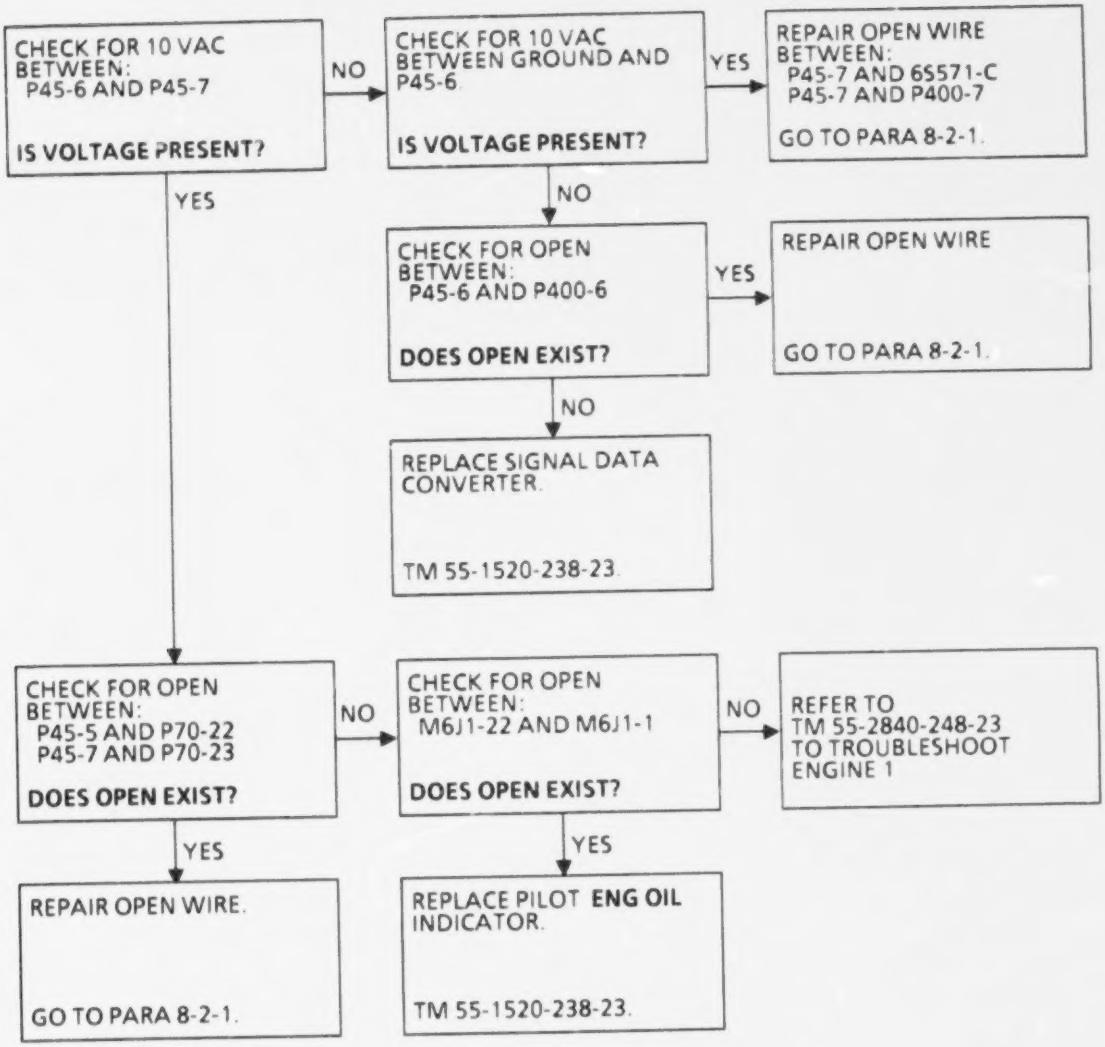
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ENG OIL INDICATOR

MM04/1


CHECK FOR 10 VAC BETWEEN: P45-6 AND P45-7
IS VOLTAGE PRESENT?
NO
CHECK FOR 10 VAC BETWEEN GROUND AND P45-6.
IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN: P45-7 AND 6S571-C P45-7 AND P400-7
GO TO PARA 8-2-1.
NO
CHECK FOR OPEN BETWEEN: P45-6 AND P400-6
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 8-2-1.
NO
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN: P45-5 AND P70-22 P45-7 AND P70-23
DOES OPEN EXIST?
NO
CHECK FOR OPEN BETWEEN: M6J1-22 AND M6J1-1
DOES OPEN EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
YES
REPLACE PILOT **ENG OIL** INDICATOR.
TM 55-1520-238-23.

442

END OF TASK

8-2-65. PILOT AND CPG ENG OIL INDICATORS - DO NOT INDICATE ENGINE 2 OIL PRESSURE

Tools: (para 8-2-64)

Personnel Required: (para 8-2-64)

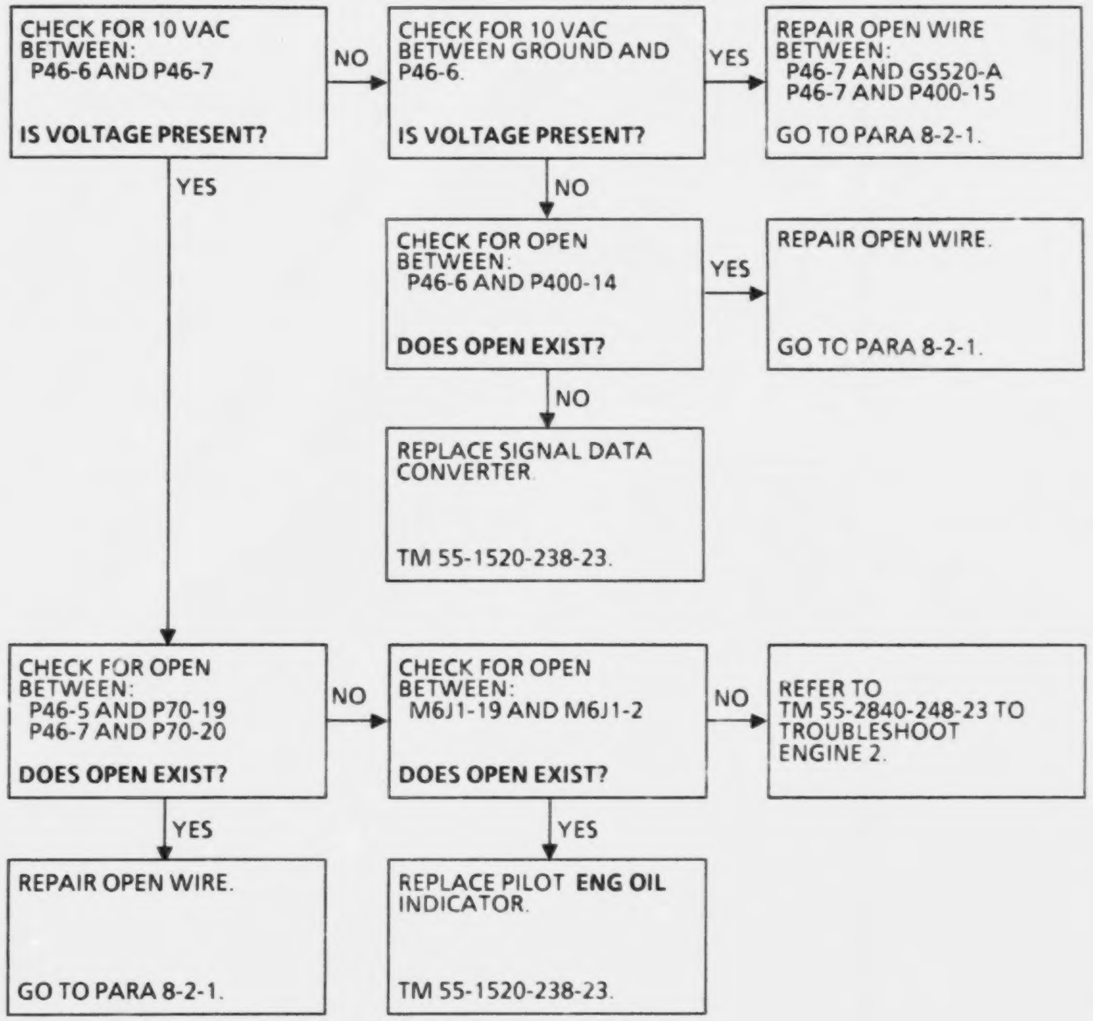
References: (para 8-2-64)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Access provisions - LN1 door opened
Para 1-3-2	ICS connected

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR 10 VAC BETWEEN: P46-6 AND P46-7
IS VOLTAGE PRESENT?
NO
CHECK FOR 10 VAC BETWEEN GROUND AND P46-6.
IS VOLTAGE PRESENT?
YES
REPAIR OPEN WIRE BETWEEN: P46-7 AND GS520-A P46-7 AND P400-15
GO TO PARA 8-2-1.
NO
CHECK FOR OPEN BETWEEN: P46-6 AND P400-14
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
REPLACE SIGNAL DATA CONVERTER.
TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN: P46-5 AND P70-19 P46-7 AND P70-20
DOES OPEN EXIST?
NO
CHECK FOR OPEN BETWEEN: M6J1-19 AND M6J1-2
DOES OPEN EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
YES
REPLACE PILOT ENG OIL INDICATOR.
TM 55-1520-238-23.

END OF TASK

8-2-66. PILOT AND CPG TORQUE INDICATORS - DO NOT INDICATE ENGINE 1 TORQUE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

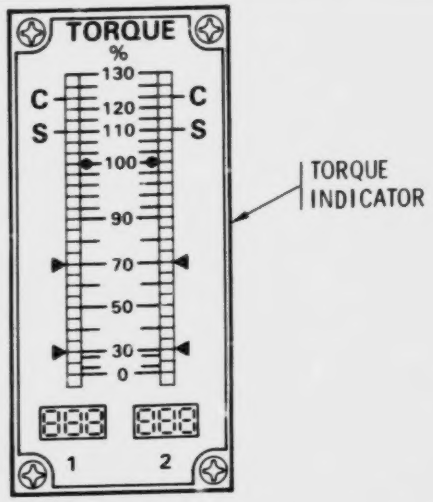
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

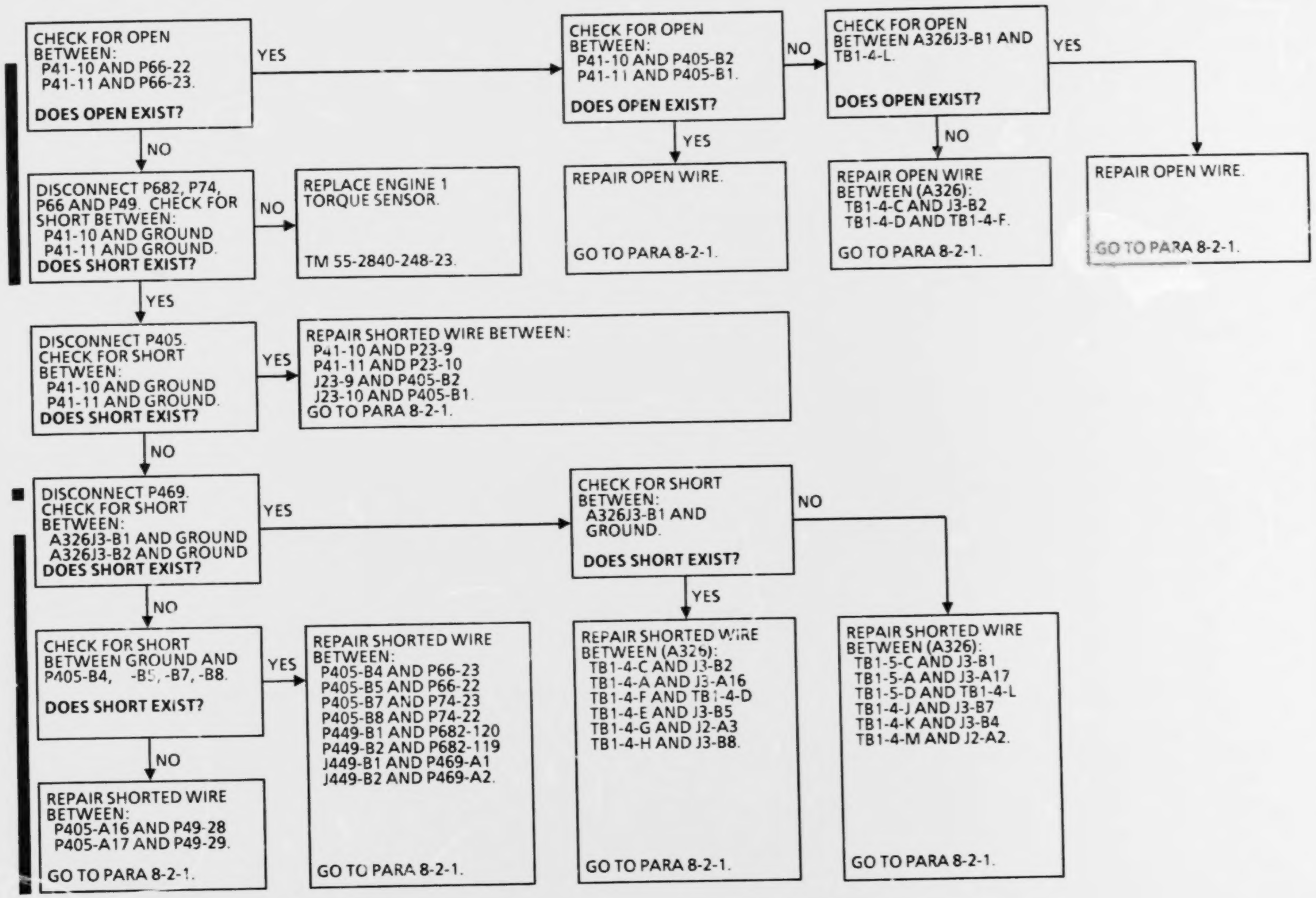
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1 door open



ENGINE INSTRUMENTS

MM04/1-1391



CHECK FOR OPEN BETWEEN:
P41-10 AND P66-22
P41-11 AND P66-23.
DOES OPEN EXIST?

DISCONNECT P682, P74, P66 AND P49. CHECK FOR SHORT BETWEEN:
P41-10 AND GROUND
P41-11 AND GROUND.
DOES SHORT EXIST?

REPLACE ENGINE 1 TORQUE SENSOR.
TM 55-2840-248-23.

DISCONNECT P405.
CHECK FOR SHORT BETWEEN:
P41-10 AND GROUND
P41-11 AND GROUND.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P41-10 AND P23-9
P41-11 AND P23-10
J23-9 AND P405-B2
J23-10 AND P405-B1.
GO TO PARA 8-2-1.

DISCONNECT P469.
CHECK FOR SHORT BETWEEN:
A326J3-B1 AND GROUND
A326J3-B2 AND GROUND
DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN GROUND AND P405-B4, -B5, -B7, -B8.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P405-A16 AND P49-28
P405-A17 AND P49-29.
GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN:
P405-B4 AND P66-23
P405-B5 AND P66-22
P405-B7 AND P74-23
P405-B8 AND P74-22
P449-B1 AND P682-120
P449-B2 AND P682-119
J449-B1 AND P469-A1
J449-B2 AND P469-A2.
GO TO PARA 8-2-1.

CHECK FOR OPEN BETWEEN:
P41-10 AND P405-B2
P41-11 AND P405-B1.
DOES OPEN EXIST?

REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

CHECK FOR OPEN BETWEEN A326J3-B1 AND TB1-4-L.
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN (A326):
TB1-4-C AND J3-B2
TB1-4-D AND TB1-4-F.
GO TO PARA 8-2-1.

REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

CHECK FOR SHORT BETWEEN:
A326J3-B1 AND GROUND.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN (A326):
TB1-4-C AND J3-B2
TB1-4-A AND J3-A16
TB1-4-F AND TB1-4-D
TB1-4-E AND J3-B5
TB1-4-G AND J2-A3
TB1-4-H AND J3-B8.
GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN (A326):
TB1-5-C AND J3-B1
TB1-5-A AND J3-A17
TB1-5-D AND TB1-4-L
TB1-4-J AND J3-B7
TB1-4-K AND J3-B4
TB1-4-M AND J2-A2.
GO TO PARA 8-2-1.

END OF TASK

8-2-67. CPG SDD - DOES NOT INDICATE ENG 1 AND/OR ENG 2 OIL PRESSURE

Tools: (para 8-2-66)

Personnel Required: (para 8-2-66)

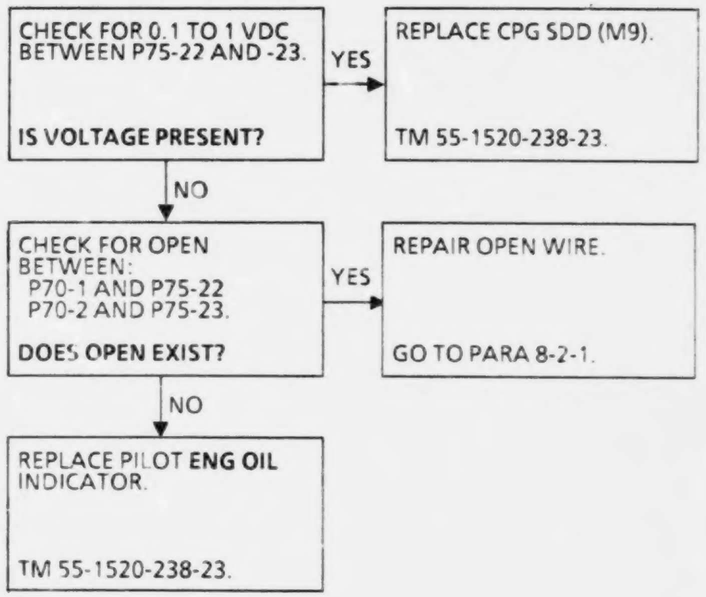
References: (para 8-2-66)

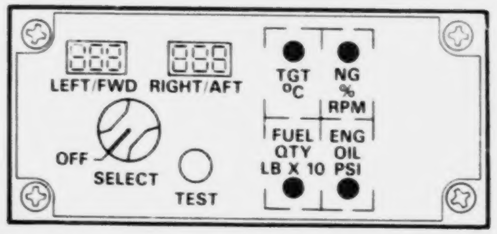
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
TM 55-1520-238-10	Engine No. 1/No. 2 running, as required

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR 0.1 TO 1 VDC BETWEEN P75-22 AND -23.
IS VOLTAGE PRESENT?
YES
REPLACE CPG SDD (M9).
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN:
P70-1 AND P75-22
P70-2 AND P75-23.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
REPLACE PILOT ENG OIL INDICATOR.
TM 55-1520-238-23.


LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST

SELECTABLE DIGITAL DISPLAY

MM04/1-1444

END OF TASK

8-2-68. PILOT TORQUE INDICATOR - DOES NOT INDICATE ENGINE 1 TORQUE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter Digital, AN/PSM-45	6625-01-139-2512

Personnel Required:

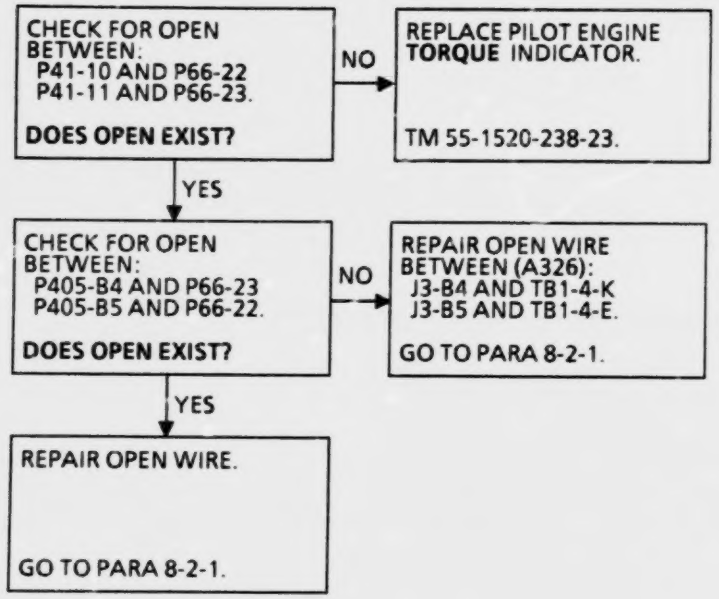
68F10 Aircraft Electrician

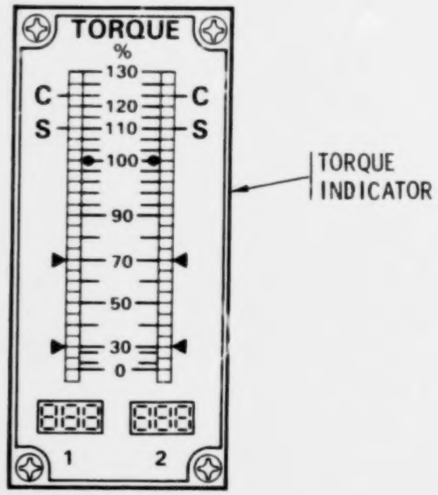
References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed Access provisions - LN1 door opened


CHECK FOR OPEN BETWEEN: P41-10 AND P66-22 P41-11 AND P66-23. DOES OPEN EXIST?
NO
REPLACE PILOT ENGINE TORQUE INDICATOR. TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN: P405-B4 AND P66-23 P405-B5 AND P66-22. DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN (A326): J3-B4 AND TB1-4-K J3-B5 AND TB1-4-E. GO TO PARA 8-2-1.
YES
REPAIR OPEN WIRE. GO TO PARA 8-2-1.


TORQUE
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110
100
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70
50
30
0
1
2
TORQUE INDICATOR

ENGINE INSTRUMENTS
(TYPICAL)

MM04/1-1392

END OF TASK

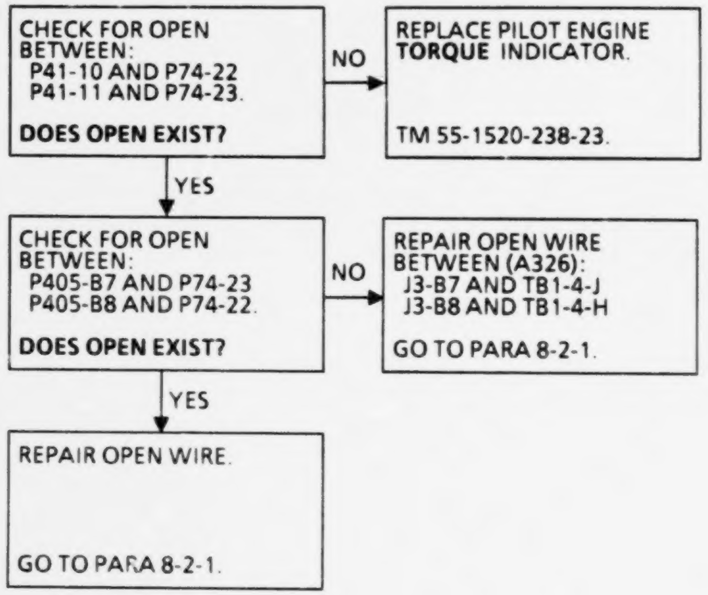
8-2-69. CPG TORQUE INDICATOR - DOES NOT INDICATE ENGINE 1 TORQUE

Tools: (Para 8-2-68)

Personnel Required: (Para 8-2-68)

References: (Para 8-2-68)

Equipment Conditions: (Para 8-2-68)


CHECK FOR OPEN BETWEEN: P41-10 AND P74-22 P41-11 AND P74-23. DOES OPEN EXIST?
NO
REPLACE PILOT ENGINE TORQUE INDICATOR. TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN: P405-B7 AND P74-23 P405-B8 AND P74-22. DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN (A326): J3-B7 AND TB1-4-J J3-B8 AND TB1-4-H GO TO PARA 8-2-1.
YES
REPAIR OPEN WIRE. GO TO PARA 8-2-1.

END OF TASK

8-2-70. PILOT AND CPG TORQUE INDICATORS - DO NOT INDICATE ENGINE 2 TORQUE

Tools: (Para 8-2-68)

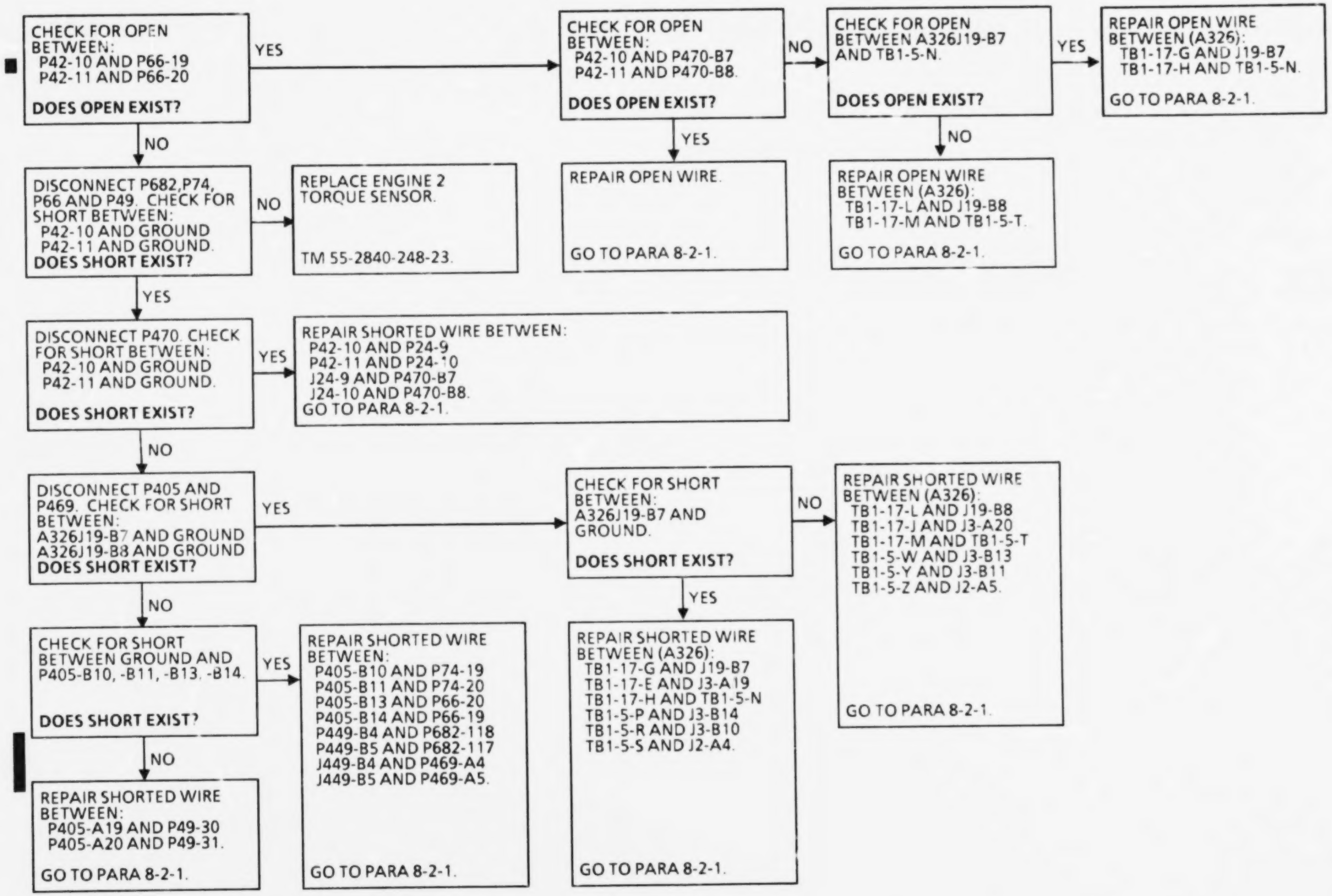
Personnel Required: (Para 8-2-68)

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN1 door opened



CHECK FOR OPEN BETWEEN:
P42-10 AND P66-19
P42-11 AND P66-20
DOES OPEN EXIST?

CHECK FOR OPEN BETWEEN:
P42-10 AND P470-B7
P42-11 AND P470-B8.
DOES OPEN EXIST?

CHECK FOR OPEN BETWEEN A326J19-B7 AND TB1-5-N.
DOES OPEN EXIST?

REPAIR OPEN WIRE BETWEEN (A326):
TB1-17-G AND J19-B7
TB1-17-H AND TB1-5-N.
GO TO PARA 8-2-1.

REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN (A326):
TB1-17-L AND J19-B8
TB1-17-M AND TB1-5-T.
GO TO PARA 8-2-1.

DISCONNECT P682, P74, P66 AND P49. CHECK FOR SHORT BETWEEN:
P42-10 AND GROUND
P42-11 AND GROUND.
DOES SHORT EXIST?

REPLACE ENGINE 2 TORQUE SENSOR.
TM 55-2840-248-23.

DISCONNECT P470. CHECK FOR SHORT BETWEEN:
P42-10 AND GROUND
P42-11 AND GROUND.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P42-10 AND P24-9
P42-11 AND P24-10
J24-9 AND P470-B7
J24-10 AND P470-B8.
GO TO PARA 8-2-1.

DISCONNECT P405 AND P469. CHECK FOR SHORT BETWEEN:
A326J19-B7 AND GROUND
A326J19-B8 AND GROUND
DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN:
A326J19-B7 AND GROUND.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN (A326):
TB1-17-L AND J19-B8
TB1-17-J AND J3-A20
TB1-17-M AND TB1-5-T
TB1-5-W AND J3-B13
TB1-5-Y AND J3-B11
TB1-5-Z AND J2-A5.
GO TO PARA 8-2-1.

CHECK FOR SHORT BETWEEN GROUND AND P405-B10, -B11, -B13, -B14.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P405-B10 AND P74-19
P405-B11 AND P74-20
P405-B13 AND P66-20
P405-B14 AND P66-19
P449-B4 AND P682-118
P449-B5 AND P682-117
J449-B4 AND P469-A4
J449-B5 AND P469-A5.
GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN (A326):
TB1-17-G AND J19-B7
TB1-17-E AND J3-A19
TB1-17-H AND TB1-5-N
TB1-5-P AND J3-B14
TB1-5-R AND J3-B10
TB1-5-S AND J2-A4.
GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN:
P405-A19 AND P49-30
P405-A20 AND P49-31.
GO TO PARA 8-2-1.

END OF TASK

8-2-71. PILOT TORQUE INDICATOR - DOES NOT INDICATE ENGINE 2 TORQUE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanics	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

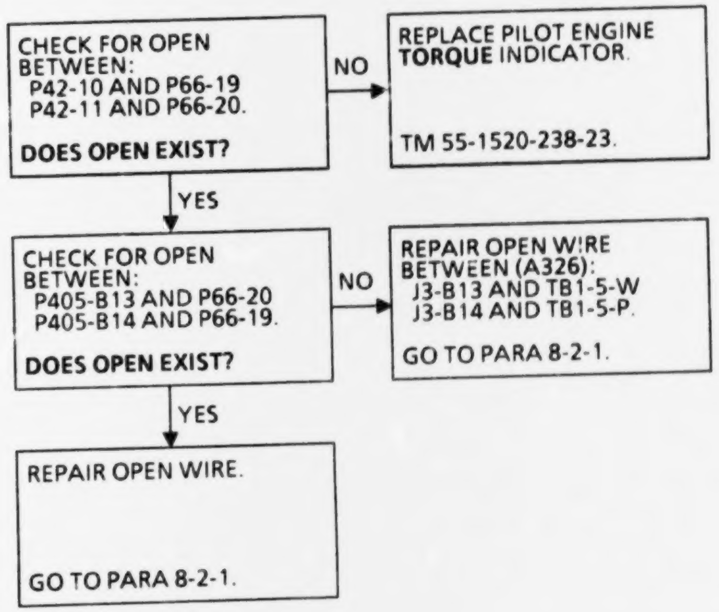
67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

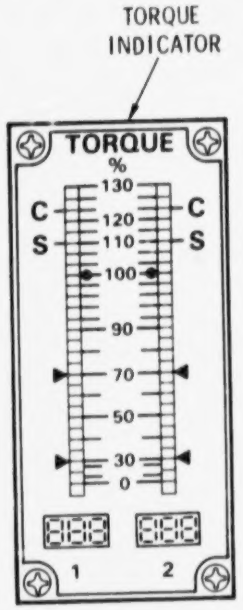
References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN1 door open


CHECK FOR OPEN BETWEEN:
P42-10 AND P66-19
P42-11 AND P66-20.
DOES OPEN EXIST?
NO
REPLACE PILOT ENGINE TORQUE INDICATOR.
TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN:
P405-B13 AND P66-20
P405-B14 AND P66-19.
DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN (A326):
J3-B13 AND TB1-5-W
J3-B14 AND TB1-5-P.
GO TO PARA 8-2-1.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.


TORQUE INDICATOR
TORQUE
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C
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C
S
130
120
110
100
90
70
50
30
0
1
2

ENGINE INSTRUMENTS
(TYPICAL)

END OF TASK

8-2-72. CPG TORQUE INDICATOR - DOES NOT INDICATE ENGINE 2 TORQUE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Aircraft Mechanic's	5180-00-323-4692
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

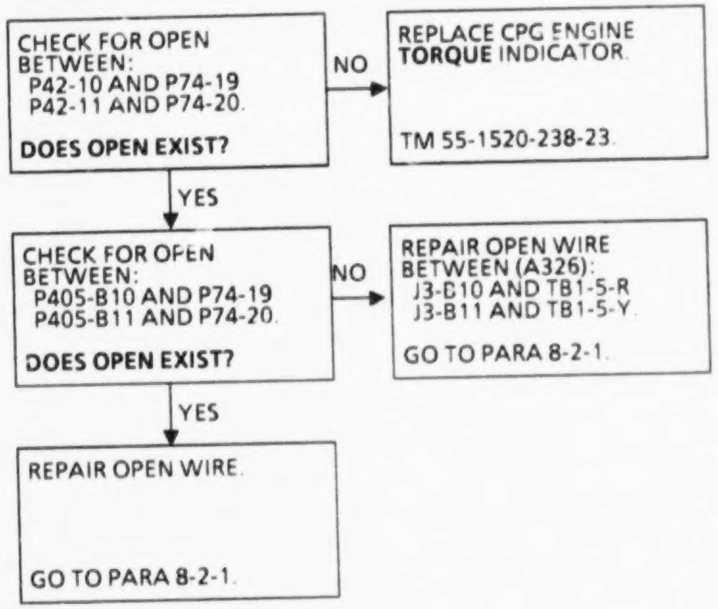
67R10	Attack Helicopter Repairer
68F10	Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN1 door open


CHECK FOR OPEN BETWEEN:
P42-10 AND P74-19
P42-11 AND P74-20.
DOES OPEN EXIST?
NO
REPLACE CPG ENGINE TORQUE INDICATOR.
TM 55-1520-238-23.
YES
CHECK FOR OPEN BETWEEN:
P405-B10 AND P74-19
P405-B11 AND P74-20.
DOES OPEN EXIST?
NO
REPAIR OPEN WIRE BETWEEN (A326):
J3-B10 AND TB1-5-R
J3-B11 AND TB1-5-Y.
GO TO PARA 8-2-1.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

MM04/1-1394

END OF TASK

8-2-73. ENGINE TORQUE DISPLAY ON PILOT VDU - FLASHES OR IS NOT PRESENT

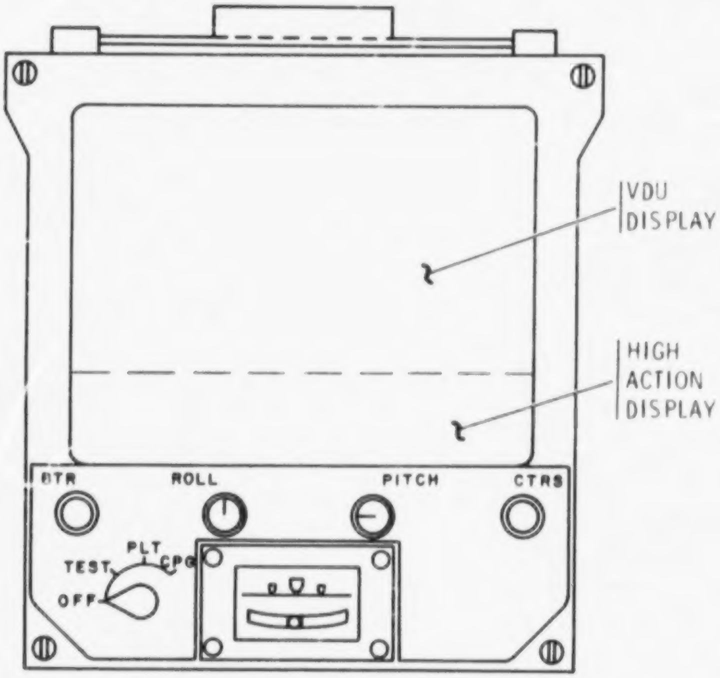
Tools: (Para 8-2-71)

Personnel Required: (Para 8-2-71)

References: (Para 8-2-71)

Equipment Conditions:

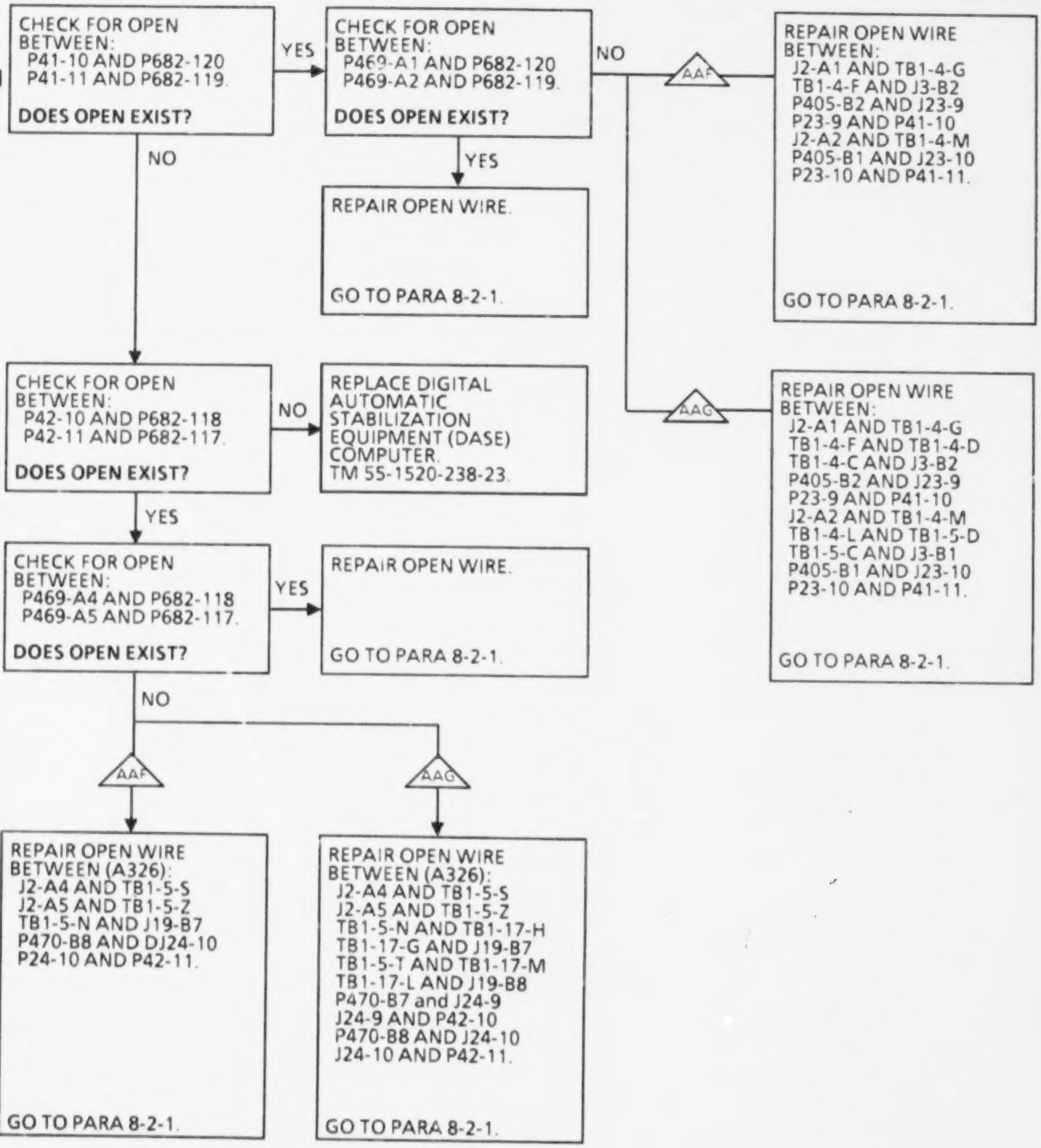
Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1 and R295 doors opened


VDU DISPLAY
HIGH ACTION DISPLAY
BTR
ROLL
PITCH
CTRS
TEST
PLT
CPG
OFF

VDU

PILOT STATION

MM04/1-1395



CHECK FOR OPEN BETWEEN:
P41-10 AND P682-120
P41-11 AND P682-119.

DOES OPEN EXIST?

CHECK FOR OPEN BETWEEN:
P469-A1 AND P682-120
P469-A2 AND P682-119.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN:
J2-A1 AND TB1-4-G
TB1-4-F AND J3-B2
P405-B2 AND J23-9
P23-9 AND P41-10
J2-A2 AND TB1-4-M
P405-B1 AND J23-10
P23-10 AND P41-11.

GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN:
J2-A1 AND TB1-4-G
TB1-4-F AND TB1-4-D
TB1-4-C AND J3-B2
P405-B2 AND J23-9
P23-9 AND P41-10
J2-A2 AND TB1-4-M
TB1-4-L AND TB1-5-D
TB1-5-C AND J3-B1
P405-B1 AND J23-10
P23-10 AND P41-11.

GO TO PARA 8-2-1.

CHECK FOR OPEN BETWEEN:
P42-10 AND P682-118
P42-11 AND P682-117.

DOES OPEN EXIST?

REPLACE DIGITAL AUTOMATIC STABILIZATION EQUIPMENT (DASE) COMPUTER.
TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P469-A4 AND P682-118
P469-A5 AND P682-117.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN (A326):
J2-A4 AND TB1-5-S
J2-A5 AND TB1-5-Z
TB1-5-N AND J19-B7
P470-B8 AND DJ24-10
P24-10 AND P42-11.

GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN (A326):
J2-A4 AND TB1-5-S
J2-A5 AND TB1-5-Z
TB1-5-N AND TB1-17-H
TB1-17-G AND J19-B7
TB1-5-T AND TB1-17-M
TB1-17-L AND J19-B8
P470-B7 and J24-9
J24-9 AND P42-10
P470-B8 AND J24-10
J24-10 AND P42-11.

GO TO PARA 8-2-1.

END OF TASK

8-2-74. PILOT AND CPG ENG-RTR INDICATORS - DO NOT INDICATE ENGINE 1 N_p

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

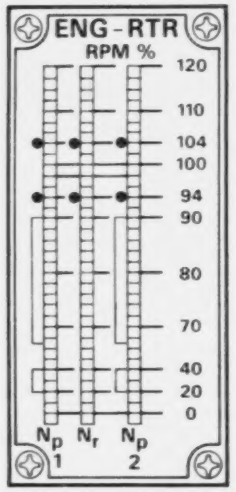
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

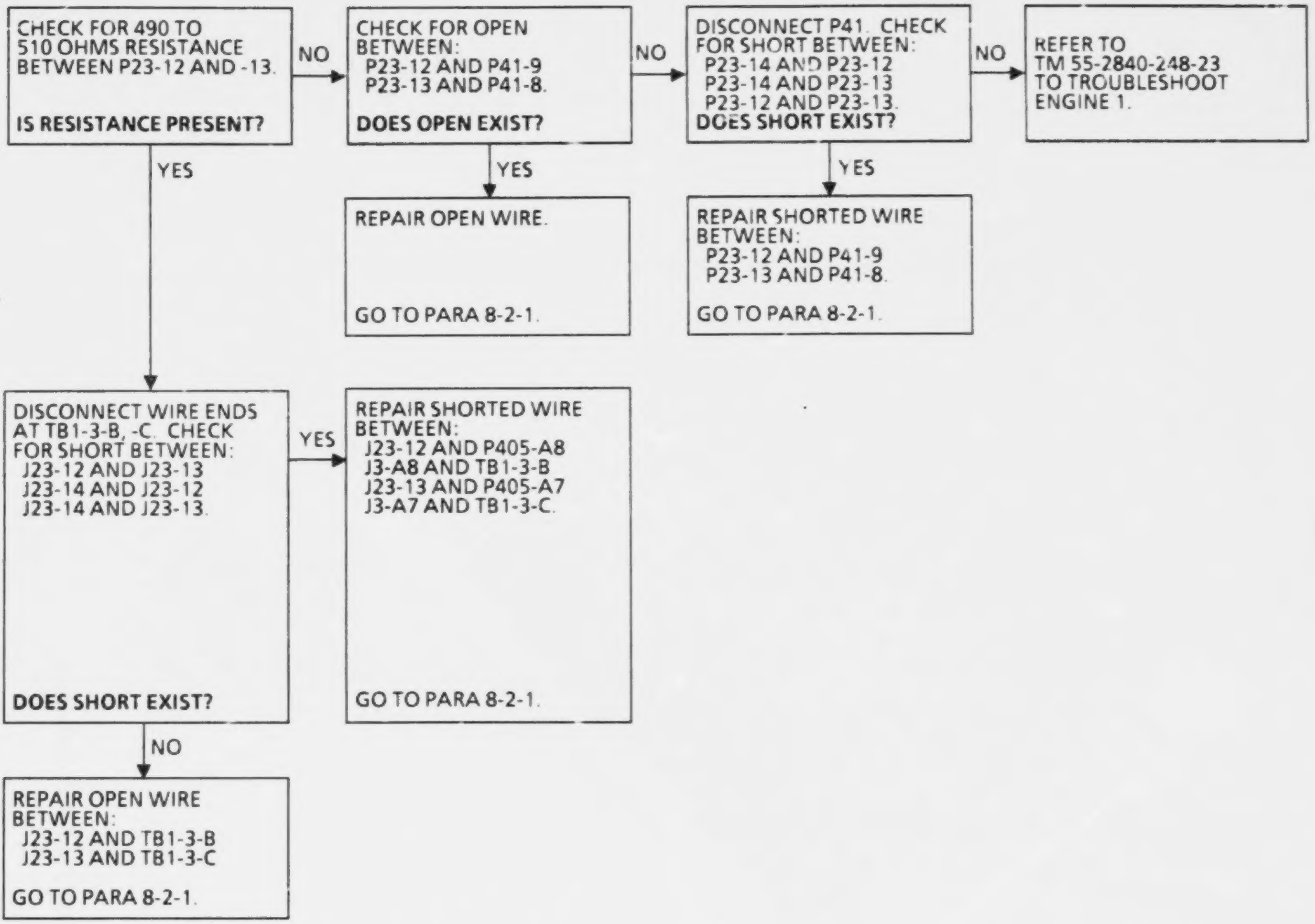
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1 door opened



ENG-RTR INDICATOR (TYPICAL)

MM04/1-1543



CHECK FOR 490 TO 510 OHMS RESISTANCE BETWEEN P23-12 AND -13.

IS RESISTANCE PRESENT?

CHECK FOR OPEN BETWEEN:
P23-12 AND P41-9
P23-13 AND P41-8.

DOES OPEN EXIST?

DISCONNECT P41. CHECK FOR SHORT BETWEEN:
P23-14 AND P23-12
P23-14 AND P23-13
P23-12 AND P23-13.

DOES SHORT EXIST?

REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN:
P23-12 AND P41-9
P23-13 AND P41-8.

GO TO PARA 8-2-1.

DISCONNECT WIRE ENDS AT TB1-3-B, -C. CHECK FOR SHORT BETWEEN:
J23-12 AND J23-13
J23-14 AND J23-12
J23-14 AND J23-13.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
J23-12 AND P405-A8
J3-A8 AND TB1-3-B
J23-13 AND P405-A7
J3-A7 AND TB1-3-C.

GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN:
J23-12 AND TB1-3-B
J23-13 AND TB1-3-C

GO TO PARA 8-2-1.

END OF TASK

8-2-75. PILOT AND CPG ENG-RTR INDICATORS - DO NOT INDICATE ENGINE 2 N_p

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

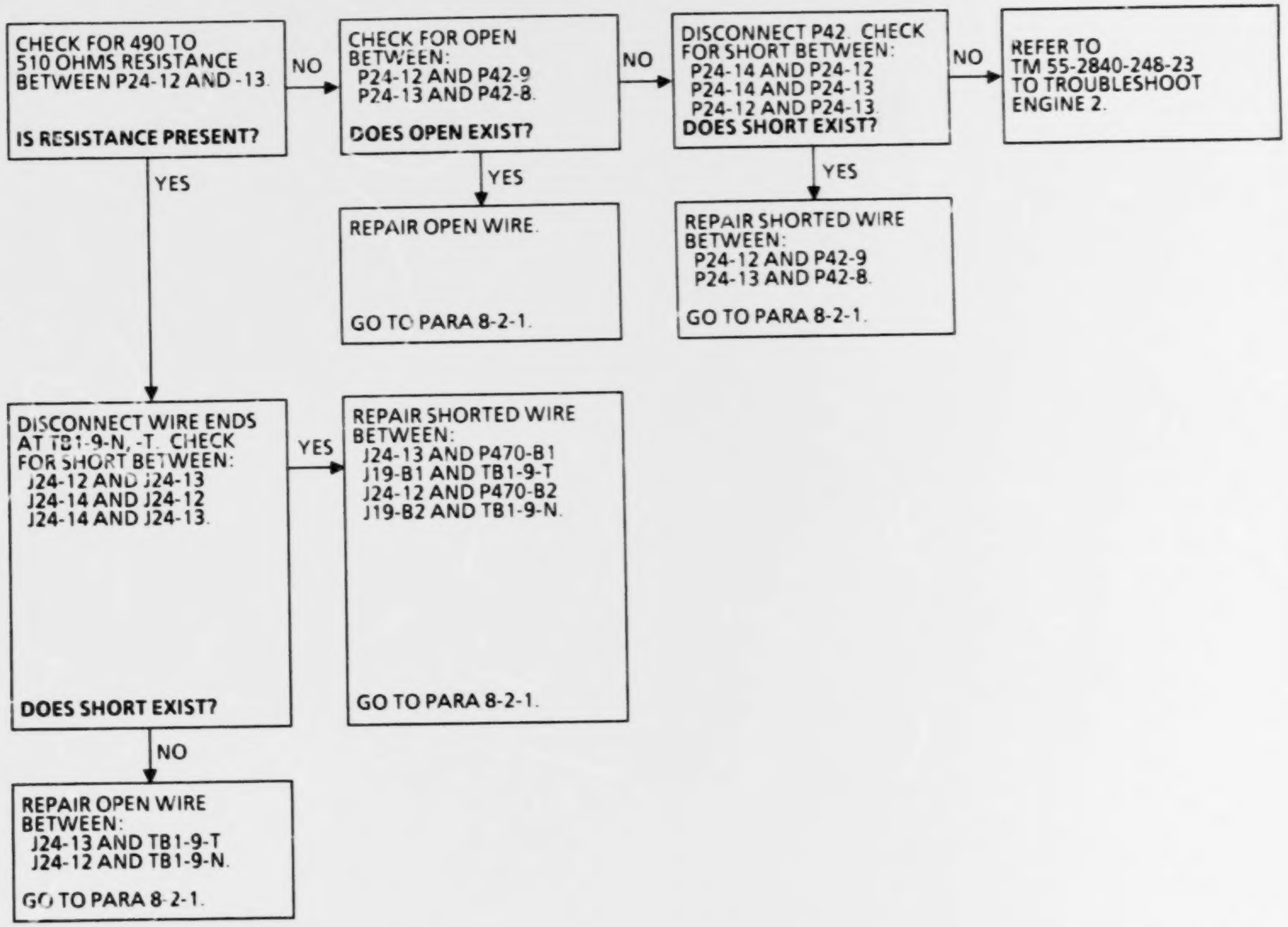
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN1 door opened



CHECK FOR 490 TO 510 OHMS RESISTANCE BETWEEN P24-12 AND -13.
IS RESISTANCE PRESENT?

CHECK FOR OPEN BETWEEN:
P24-12 AND P42-9
P24-13 AND P42-8.
DOES OPEN EXIST?

DISCONNECT P42. CHECK FOR SHORT BETWEEN:
P24-14 AND P24-12
P24-14 AND P24-13
P24-12 AND P24-13.
DOES SHORT EXIST?

REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN:
P24-12 AND P42-9
P24-13 AND P42-8.
GO TO PARA 8-2-1.

DISCONNECT WIRE ENDS AT TB1-9-N, -T. CHECK FOR SHORT BETWEEN:
J24-12 AND J24-13
J24-14 AND J24-12
J24-14 AND J24-13.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
J24-13 AND P470-B1
J19-B1 AND TB1-9-T
J24-12 AND P470-B2
J19-B2 AND TB1-9-N.
GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN:
J24-13 AND TB1-9-T
J24-12 AND TB1-9-N.
GO TO PARA 8-2-1.

END OF TASK

8-2-76. PILOT ENG-RTR INDICATOR - DOES NOT INDICATE ENGINE 1 N_p

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

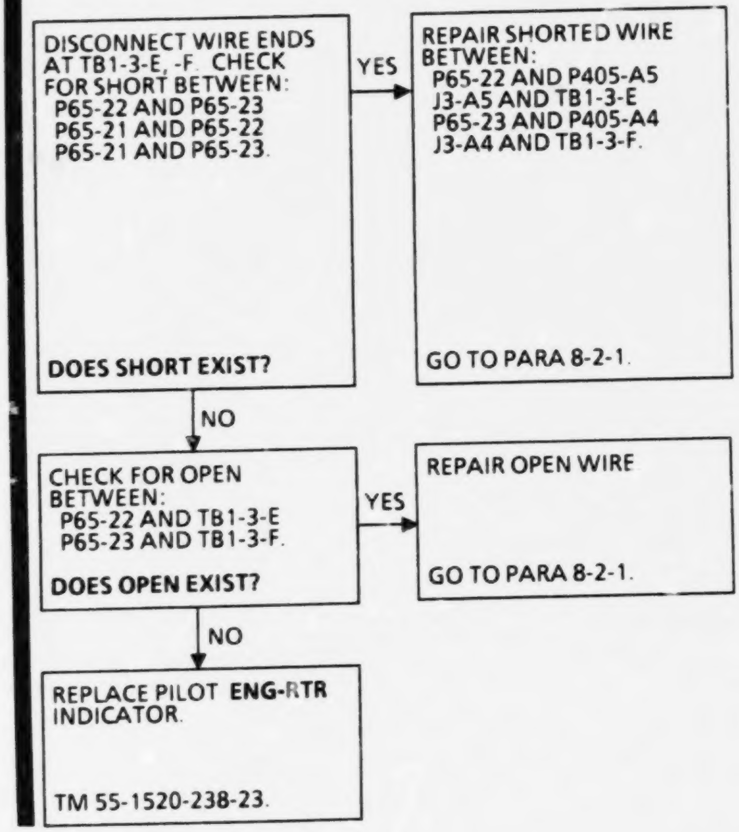
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Nontransparent barrier removed



DISCONNECT WIRE ENDS AT TB1-3-E, -F. CHECK FOR SHORT BETWEEN:
P65-22 AND P65-23
P65-21 AND P65-22
P65-21 AND P65-23.

DOES SHORT EXIST?

YES →

REPAIR SHORTED WIRE BETWEEN:
P65-22 AND P405-A5
J3-A5 AND TB1-3-E
P65-23 AND P405-A4
J3-A4 AND TB1-3-F.

GO TO PARA 8-2-1.

NO ↓

CHECK FOR OPEN BETWEEN:
P65-22 AND TB1-3-E
P65-23 AND TB1-3-F.

DOES OPEN EXIST?

YES →

REPAIR OPEN WIRE

GO TO PARA 8-2-1.

NO ↓

REPLACE PILOT ENG-RTR INDICATOR.

TM 55-1520-238-23.

END OF TASK

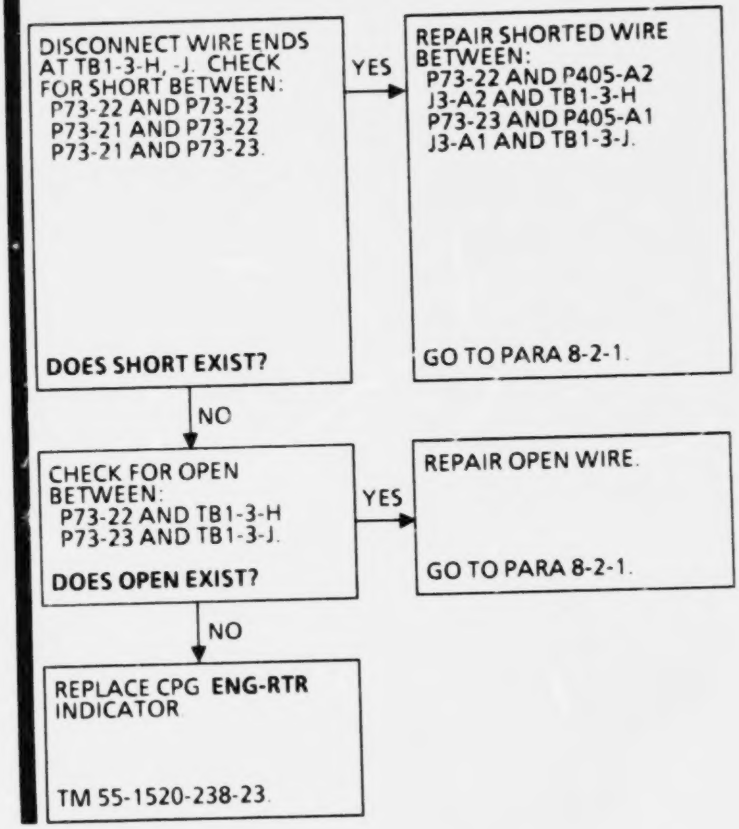
8-2-77. CPG ENG-RTR INDICATOR - DOES NOT INDICATE ENGINE 1 N_p

Tools: (para 8-2-76)

Personnel Required: (para 8-2-76)

References: (para 8-2-76)

Equipment Conditions: (para 8-2-76)


DISCONNECT WIRE ENDS AT TB1-3-H, -J. CHECK FOR SHORT BETWEEN: P73-22 AND P73-23 P73-21 AND P73-22 P73-21 AND P73-23. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN: P73-22 AND P405-A2 J3-A2 AND TB1-3-H P73-23 AND P405-A1 J3-A1 AND TB1-3-J. GO TO PARA 8-2-1.
NO
CHECK FOR OPEN BETWEEN: P73-22 AND TB1-3-H P73-23 AND TB1-3-J. DOES OPEN EXIST?
YES
REPAIR OPEN WIRE. GO TO PARA 8-2-1.
NO
REPLACE CPG ENG-RTR INDICATOR TM 55-1520-238-23.

END OF TASK

8-2-78. PILOT ENG-RTR INDICATOR - DOES NOT INDICATE ENGINE 2 N_p

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

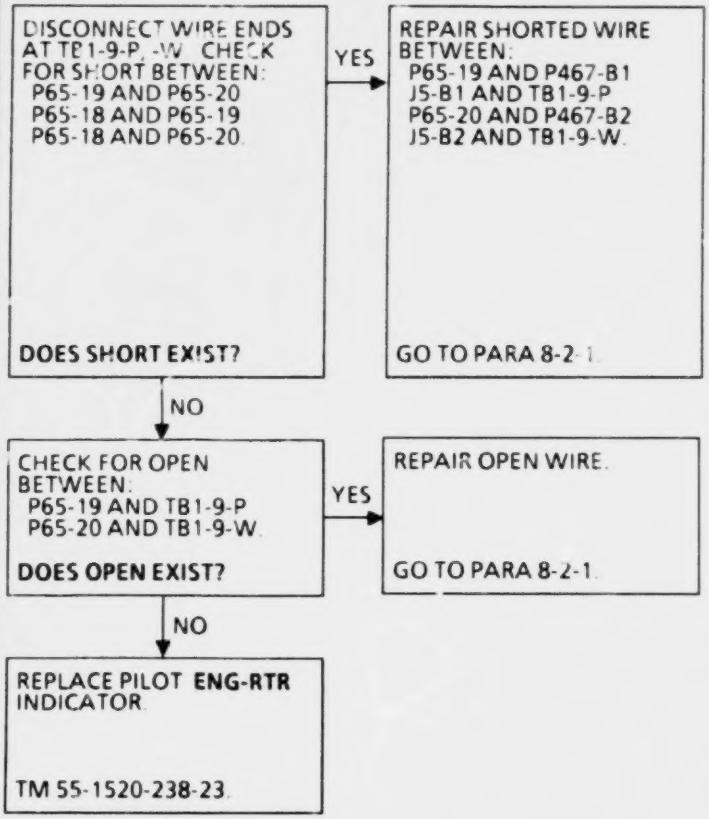
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Nontransparent barrier removed


DISCONNECT WIRE ENDS AT TB1-9-P, -W. CHECK FOR SHORT BETWEEN:
P65-19 AND P65-20
P65-18 AND P65-19
P65-18 AND P65-20.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P65-19 AND P467-B1
J5-B1 AND TB1-9-P
P65-20 AND P467-B2
J5-B2 AND TB1-9-W.

GO TO PARA 8-2-1.

CHECK FOR OPEN BETWEEN:
P65-19 AND TB1-9-P
P65-20 AND TB1-9-W.

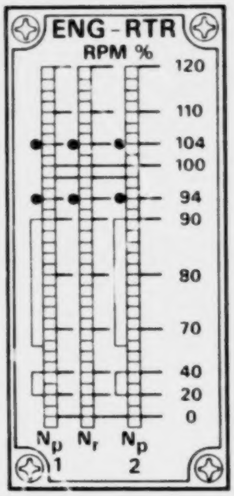
DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPLACE PILOT **ENG-RTR** INDICATOR.

TM 55-1520-238-23.



ENG-RTR INDICATOR (TYPICAL)

MM04/1-1544

END OF TASK

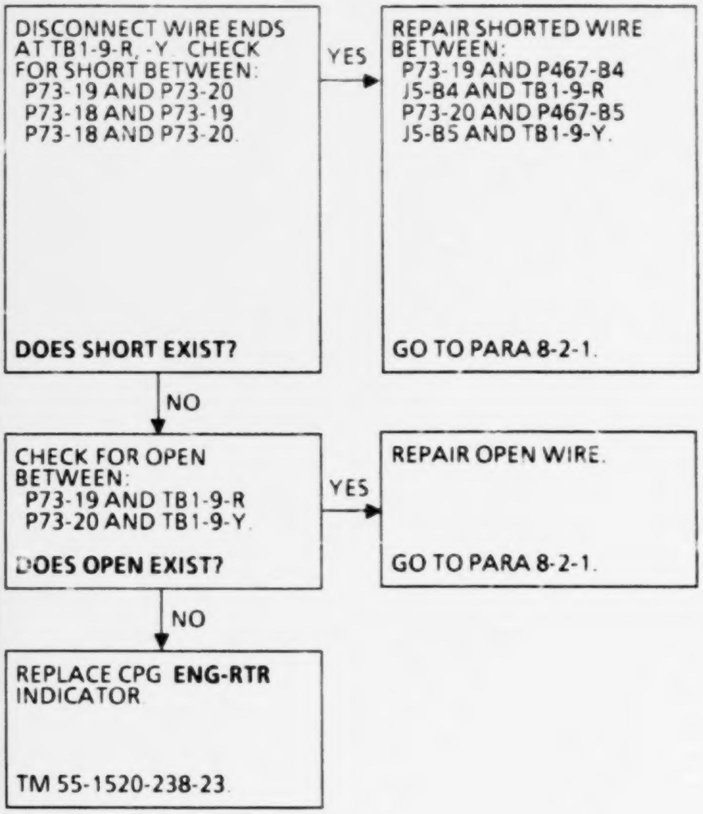
8-2-79. CPG ENG-RTR INDICATOR - DOES NOT INDICATE ENGINE 2 N_p

Tools: (para 8-2-78)

References: (para 8-2-78)

Personnel Required: (para 8-2-78)

Equipment Conditions: (para 8-2-78)



DISCONNECT WIRE ENDS AT TB1-9-R, -Y. CHECK FOR SHORT BETWEEN:
- P73-19 AND P73-20
- P73-18 AND P73-19
- P73-18 AND P73-20.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
- P73-19 AND P467-B4
- J5-B4 AND TB1-9-R
- P73-20 AND P467-B5
- J5-B5 AND TB1-9-Y.

GO TO PARA 8-2-1.

NO: CHECK FOR OPEN BETWEEN:
- P73-19 AND TB1-9-R
- P73-20 AND TB1-9-Y.

DOES OPEN EXIST?

YES: REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

NO: REPLACE CPG **ENG-RTR** INDICATOR.

TM 55-1520-238-23.

END OF TASK

8-2-80. PILOT AND CPG ENG-RTR INDICATORS - DO NOT INDICATE N_r

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

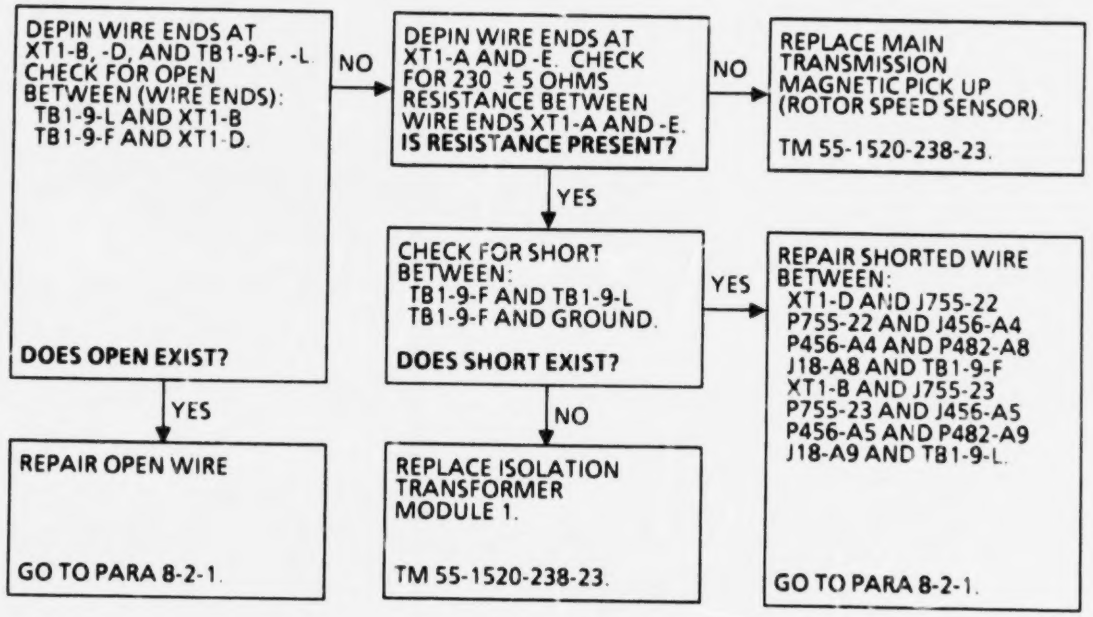
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Nontransparent barrier removed
	Access provisions - L200 panel removed



DEPIN WIRE ENDS AT XT1-B, -D, AND TB1-9-F, -L CHECK FOR OPEN BETWEEN (WIRE ENDS):
TB1-9-L AND XT1-B
TB1-9-F AND XT1-D.
DOES OPEN EXIST?

DEPIN WIRE ENDS AT XT1-A AND -E. CHECK FOR 230 ± 5 OHMS RESISTANCE BETWEEN WIRE ENDS XT1-A AND -E.
IS RESISTANCE PRESENT?

REPLACE MAIN TRANSMISSION MAGNETIC PICK UP (ROTOR SPEED SENSOR).
TM 55-1520-238-23.

CHECK FOR SHORT BETWEEN:
TB1-9-F AND TB1-9-L
TB1-9-F AND GROUND.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
XT1-D AND J755-22
P755-22 AND J456-A4
P456-A4 AND P482-A8
J18-A8 AND TB1-9-F
XT1-B AND J755-23
P755-23 AND J456-A5
P456-A5 AND P482-A9
J18-A9 AND TB1-9-L.
GO TO PARA 8-2-1.

REPAIR OPEN WIRE
GO TO PARA 8-2-1.

REPLACE ISOLATION TRANSFORMER MODULE 1.
TM 55-1520-238-23.

END OF TASK

8-2-81. PILOT ENG-RTR INDICATOR - DOES NOT INDICATE N_r

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed Nontransparent barrier removed

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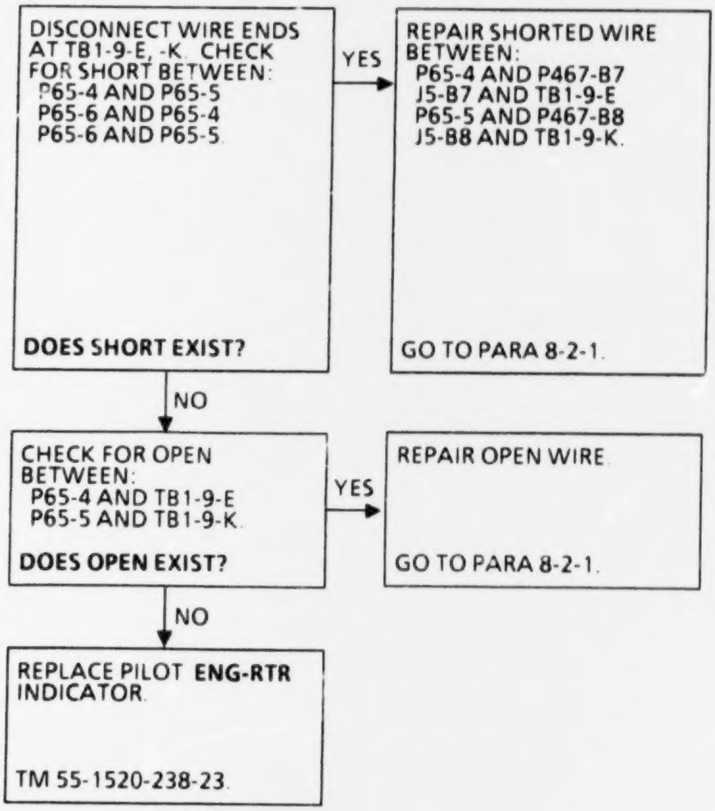


DISCONNECT WIRE ENDS AT TB1-9-E, -K. CHECK FOR SHORT BETWEEN:
P65-4 AND P65-5
P65-6 AND P65-4
P65-6 AND P65-5.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
P65-4 AND P467-B7
J5-B7 AND TB1-9-E
P65-5 AND P467-B8
J5-B8 AND TB1-9-K.

GO TO PARA 8-2-1.

NO: CHECK FOR OPEN BETWEEN:
P65-4 AND TB1-9-E
P65-5 AND TB1-9-K.

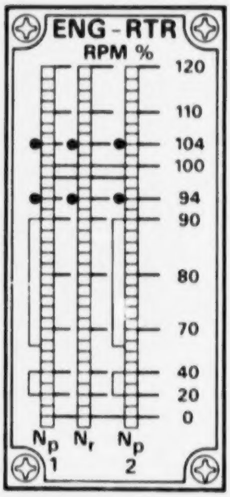
DOES OPEN EXIST?

YES: REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

NO: REPLACE PILOT **ENG-RTR** INDICATOR.

TM 55-1520-238-23.



ENG-RTR INDICATOR (TYPICAL)

MM04/1-15

END OF TASK

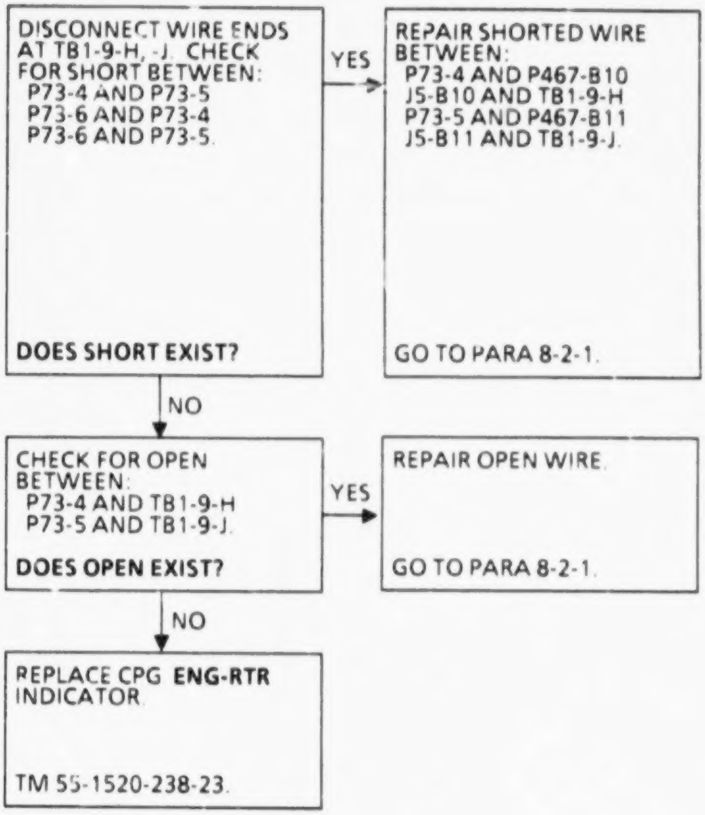
8-2-82. CPG ENG-RTR INDICATOR - DOES NOT INDICATE N_r

Tools: (para 8-2-81)

References: (para 8-2-81)

Personnel Required: (para 8-2-81)

Equipment Conditions: (para 8-2-81)


DISCONNECT WIRE ENDS AT TB1-9-H, -J. CHECK FOR SHORT BETWEEN:
P73-4 AND P73-5
P73-6 AND P73-4
P73-6 AND P73-5.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN:
P73-4 AND P467-B10
J5-B10 AND TB1-9-H
P73-5 AND P467-B11
J5-B11 AND TB1-9-J.
GO TO PARA 8-2-1.
NO
CHECK FOR OPEN BETWEEN:
P73-4 AND TB1-9-H
P73-5 AND TB1-9-J.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
REPLACE CPG ENG-RTR INDICATOR.
TM 55-1520-238-23.

END OF TASK

8-2-83. PILOT N_G INDICATOR - DOES NOT INDICATE ENGINE 1 N_G

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

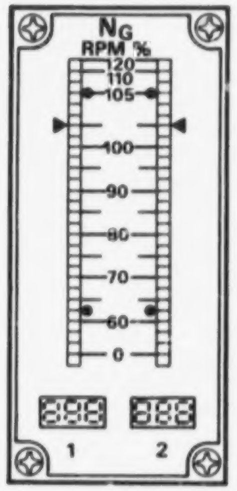
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

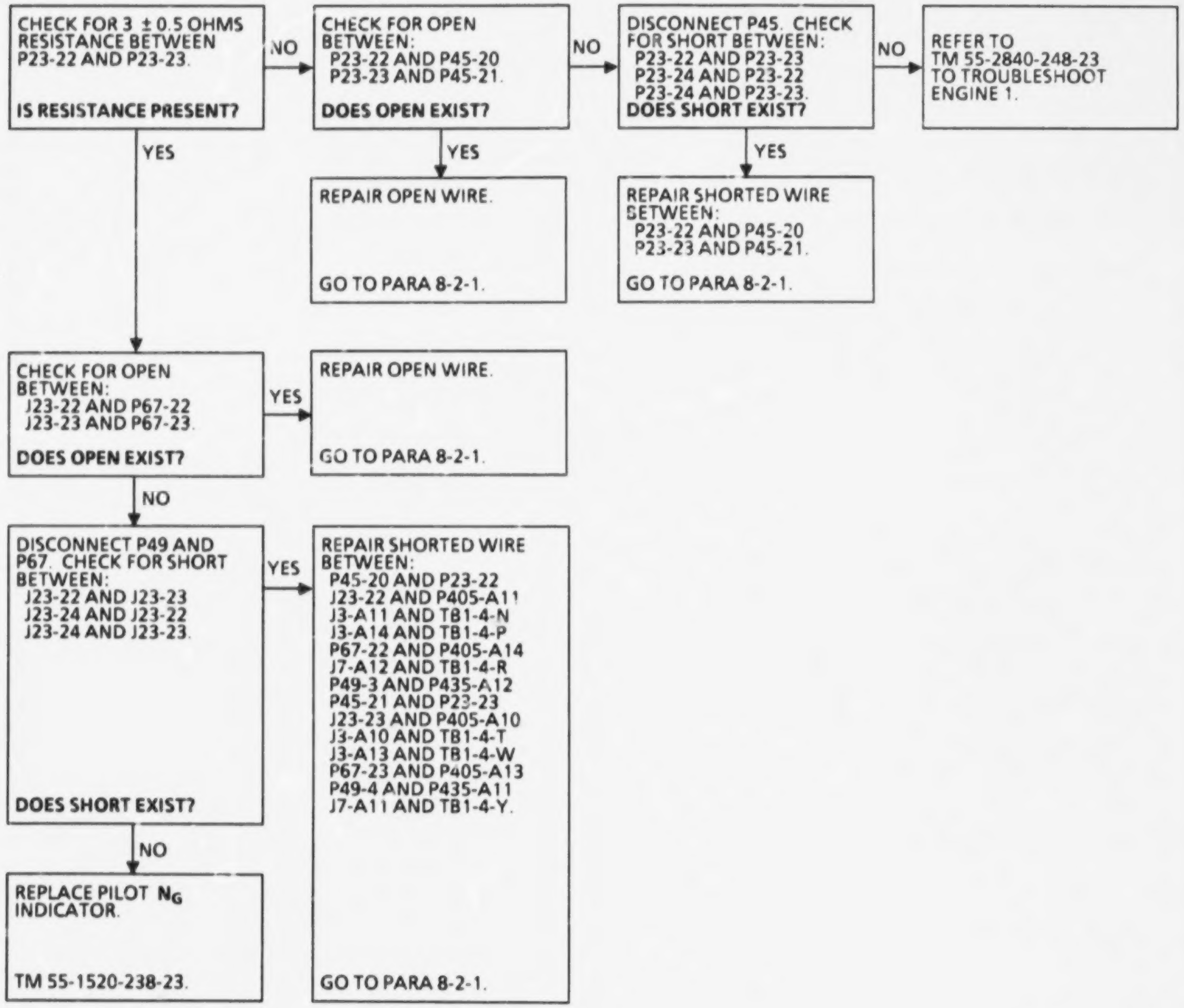
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1 door opened


NG
RPM %
120
110
105
100
90
80
70
60
0
1
2

N_G INDICATOR

MM04/1-1546


CHECK FOR 3 ± 0.5 OHMS RESISTANCE BETWEEN P23-22 AND P23-23.
IS RESISTANCE PRESENT?
NO
CHECK FOR OPEN BETWEEN: P23-22 AND P45-20 P23-23 AND P45-21.
DOES OPEN EXIST?
NO
DISCONNECT P45. CHECK FOR SHORT BETWEEN: P23-22 AND P23-23 P23-24 AND P23-22 P23-24 AND P23-23.
DOES SHORT EXIST?
NO
REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
YES
REPAIR SHORTED WIRE BETWEEN: P23-22 AND P45-20 P23-23 AND P45-21.
GO TO PARA 8-2-1.
YES
CHECK FOR OPEN BETWEEN: J23-22 AND P67-22 J23-23 AND P67-23.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
DISCONNECT P49 AND P67. CHECK FOR SHORT BETWEEN: J23-22 AND J23-23 J23-24 AND J23-22 J23-24 AND J23-23.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN: P45-20 AND P23-22 J23-22 AND P405-A11 J3-A11 AND TB1-4-N J3-A14 AND TB1-4-P P67-22 AND P405-A14 J7-A12 AND TB1-4-R P49-3 AND P435-A12 P45-21 AND P23-23 J23-23 AND P405-A10 J3-A10 AND TB1-4-T J3-A13 AND TB1-4-W P67-23 AND P405-A13 P49-4 AND P435-A11 J7-A11 AND TB1-4-Y.
GO TO PARA 8-2-1.
NO
REPLACE PILOT NG INDICATOR.
TM 55-1520-238-23.

END OF TASK

8-2-84. PILOT N_G INDICATOR - DOES NOT INDICATE ENGINE 2 N_G

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

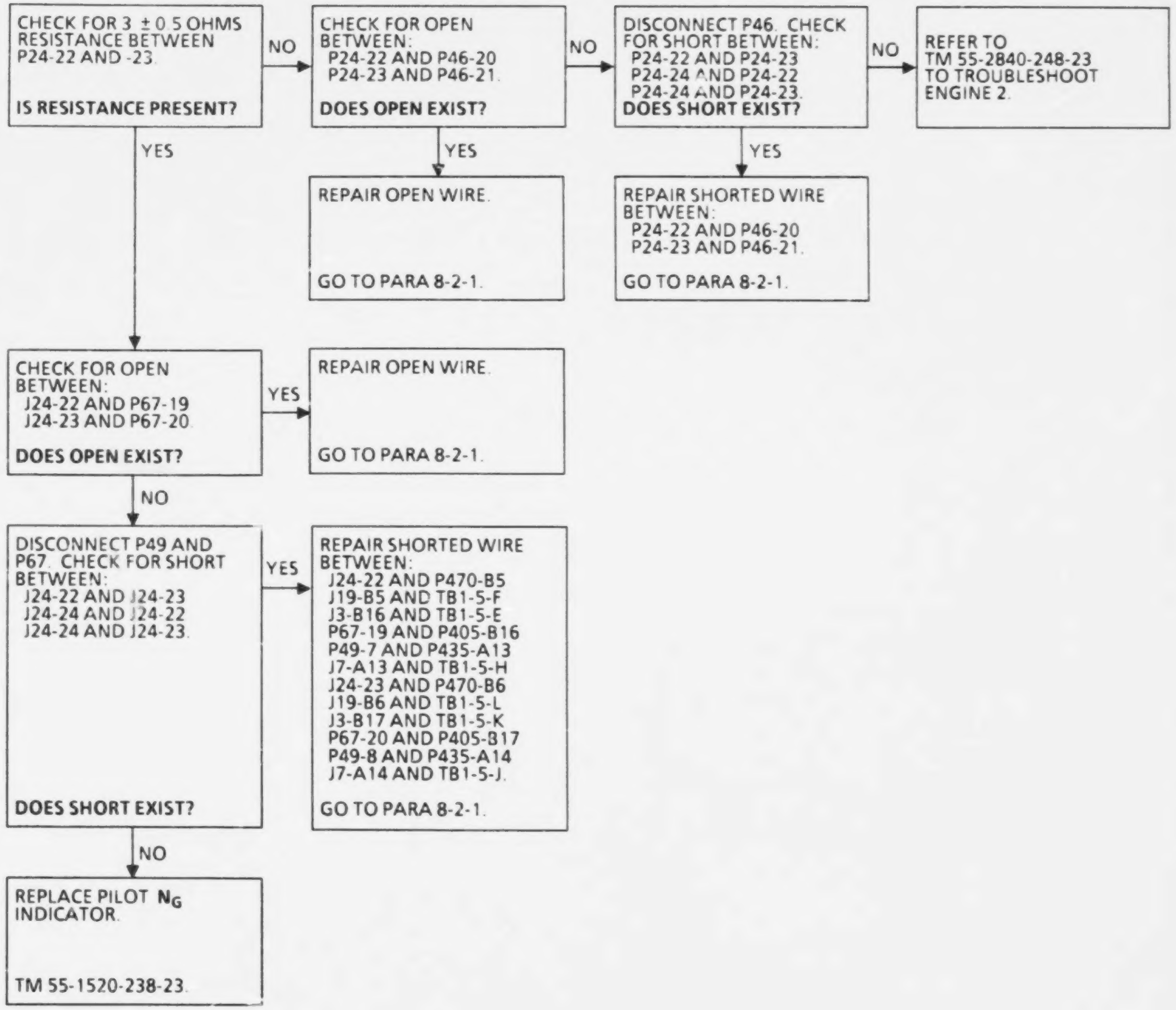
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - RN1 door opened



CHECK FOR 3 ± 0.5 OHMS RESISTANCE BETWEEN P24-22 AND -23.

IS RESISTANCE PRESENT?

CHECK FOR OPEN BETWEEN:
P24-22 AND P46-20
P24-23 AND P46-21.

DOES OPEN EXIST?

DISCONNECT P46. CHECK FOR SHORT BETWEEN:
P24-22 AND P24-23
P24-24 AND P24-22
P24-24 AND P24-23.

DOES SHORT EXIST?

REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN:
P24-22 AND P46-20
P24-23 AND P46-21.

GO TO PARA 8-2-1.

CHECK FOR OPEN BETWEEN:
J24-22 AND P67-19
J24-23 AND P67-20.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

DISCONNECT P49 AND P67. CHECK FOR SHORT BETWEEN:
J24-22 AND J24-23
J24-24 AND J24-22
J24-24 AND J24-23.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
J24-22 AND P470-B5
J19-B5 AND TB1-5-F
J3-B16 AND TB1-5-E
P67-19 AND P405-B16
P49-7 AND P435-A13
J7-A13 AND TB1-5-H
J24-23 AND P470-B6
J19-B6 AND TB1-5-L
J3-B17 AND TB1-5-K
P67-20 AND P405-B17
P49-8 AND P435-A14
J7-A14 AND TB1-5-J.

GO TO PARA 8-2-1.

REPLACE PILOT N_G INDICATOR.

TM 55-1520-238-23.

END OF TASK

8-2-85. CPG SELECTABLE DIGITAL DISPLAY PANEL - DOES NOT INDICATE ENGINE 1 AND/OR ENGINE 2 N_G

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

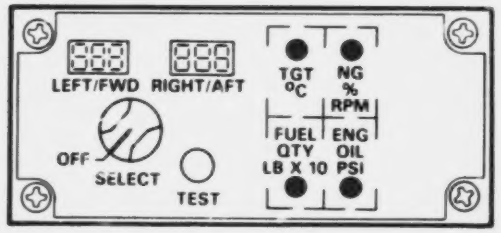
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

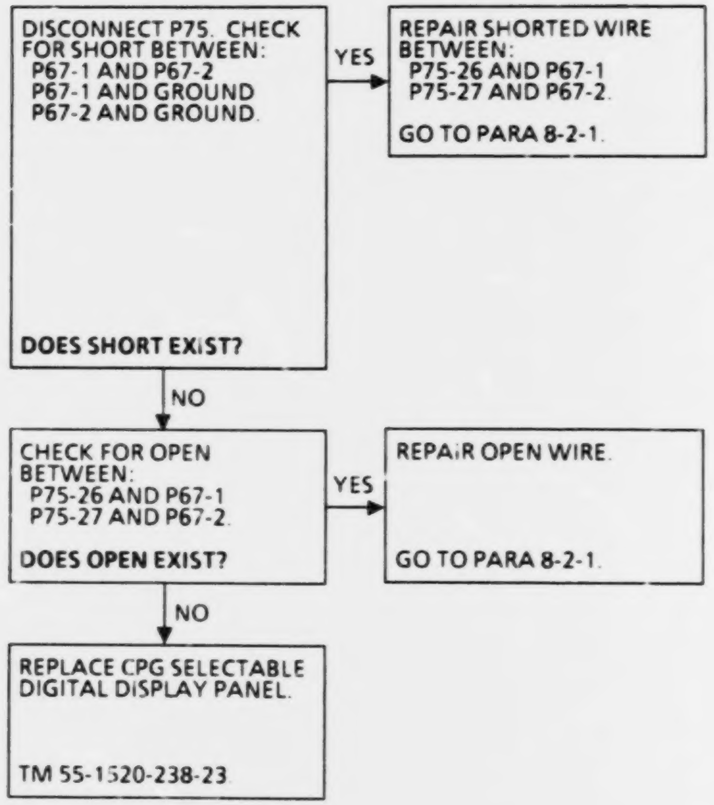
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed



CPG SELECTABLE DIGITAL DISPLAY PANEL

MM04/1-1547


DISCONNECT P75. CHECK FOR SHORT BETWEEN:
P67-1 AND P67-2
P67-1 AND GROUND
P67-2 AND GROUND.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P75-26 AND P67-1
P75-27 AND P67-2.

GO TO PARA 8-2-1.

CHECK FOR OPEN BETWEEN:
P75-26 AND P67-1
P75-27 AND P67-2.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

REPLACE CPG SELECTABLE DIGITAL DISPLAY PANEL.

TM 55-1520-238-23

END OF TASK

8-2-86. PILOT TGT INDICATOR - DOES NOT INDICATE ENGINE 1 TGT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

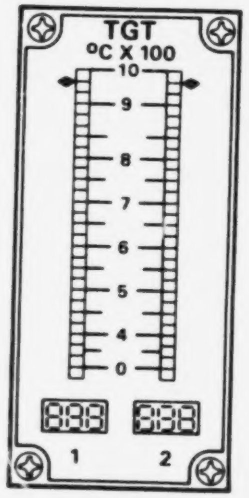
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

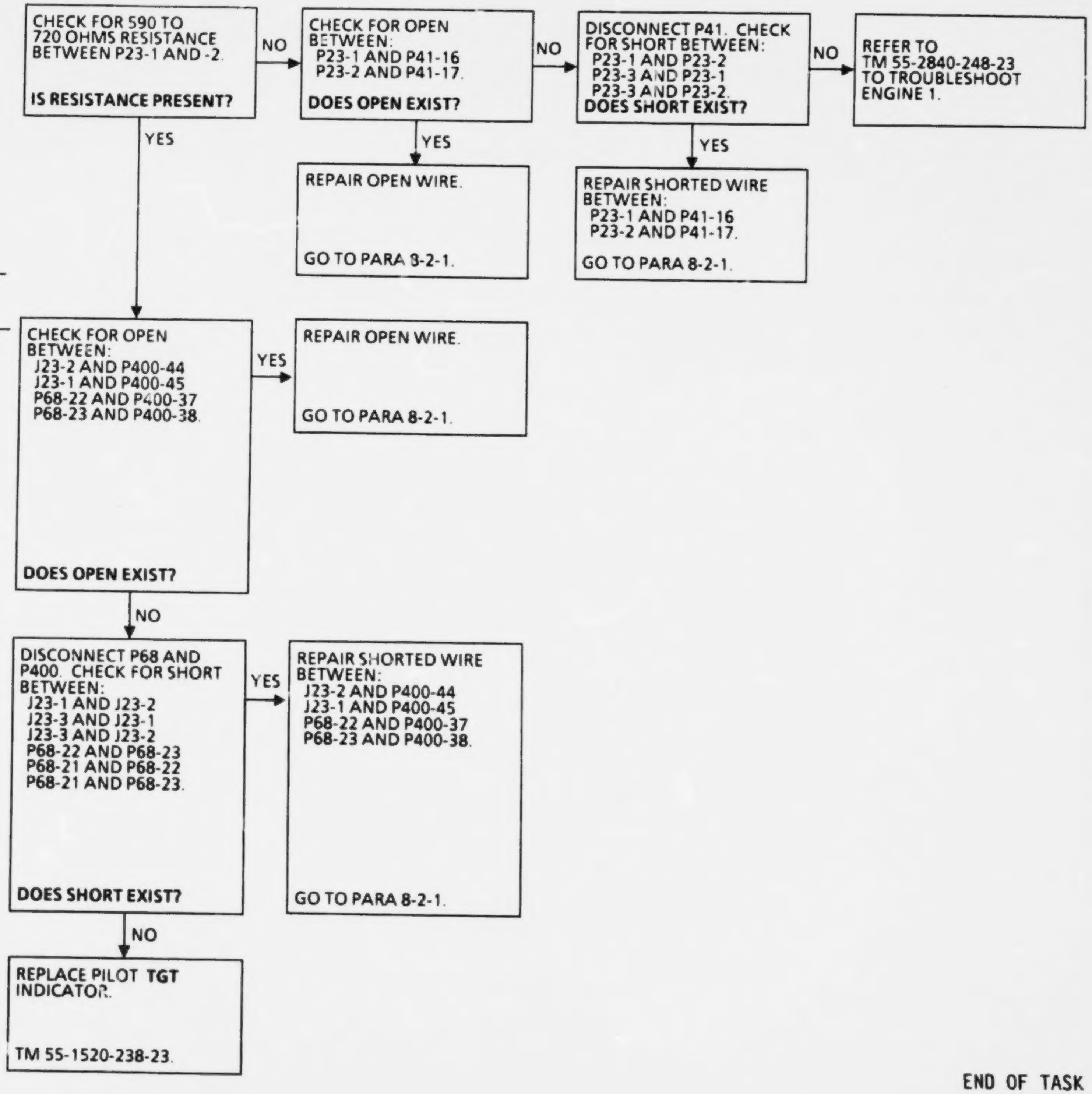
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1 door opened



TGT INDICATOR

MM04/1-1548



CHECK FOR 590 TO 720 OHMS RESISTANCE BETWEEN P23-1 AND -2.

IS RESISTANCE PRESENT?

NO: CHECK FOR OPEN BETWEEN:
P23-1 AND P41-16
P23-2 AND P41-17.

DOES OPEN EXIST?

YES: REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

NO: DISCONNECT P41. CHECK FOR SHORT BETWEEN:
P23-1 AND P23-2
P23-3 AND P23-1
P23-3 AND P23-2.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
P23-1 AND P41-16
P23-2 AND P41-17.

GO TO PARA 8-2-1.

NO: REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 1.

YES: CHECK FOR OPEN BETWEEN:
J23-2 AND P400-44
J23-1 AND P400-45
P68-22 AND P400-37
P68-23 AND P400-38.

DOES OPEN EXIST?

YES: REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

NO: DISCONNECT P68 AND P400. CHECK FOR SHORT BETWEEN:
J23-1 AND J23-2
J23-3 AND J23-1
J23-3 AND J23-2
P68-22 AND P68-23
P68-21 AND P68-22
P68-21 AND P68-23.

DOES SHORT EXIST?

YES: REPAIR SHORTED WIRE BETWEEN:
J23-2 AND P400-44
J23-1 AND P400-45
P68-22 AND P400-37
P68-23 AND P400-38.

GO TO PARA 8-2-1.

NO: REPLACE PILOT TGT INDICATOR.

TM 55-1520-238-23.

END OF TASK

8-2-87. PILOT TGT INDICATOR - DOES NOT INDICATE ENGINE 2 TGT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

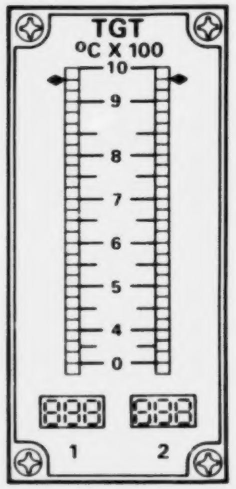
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

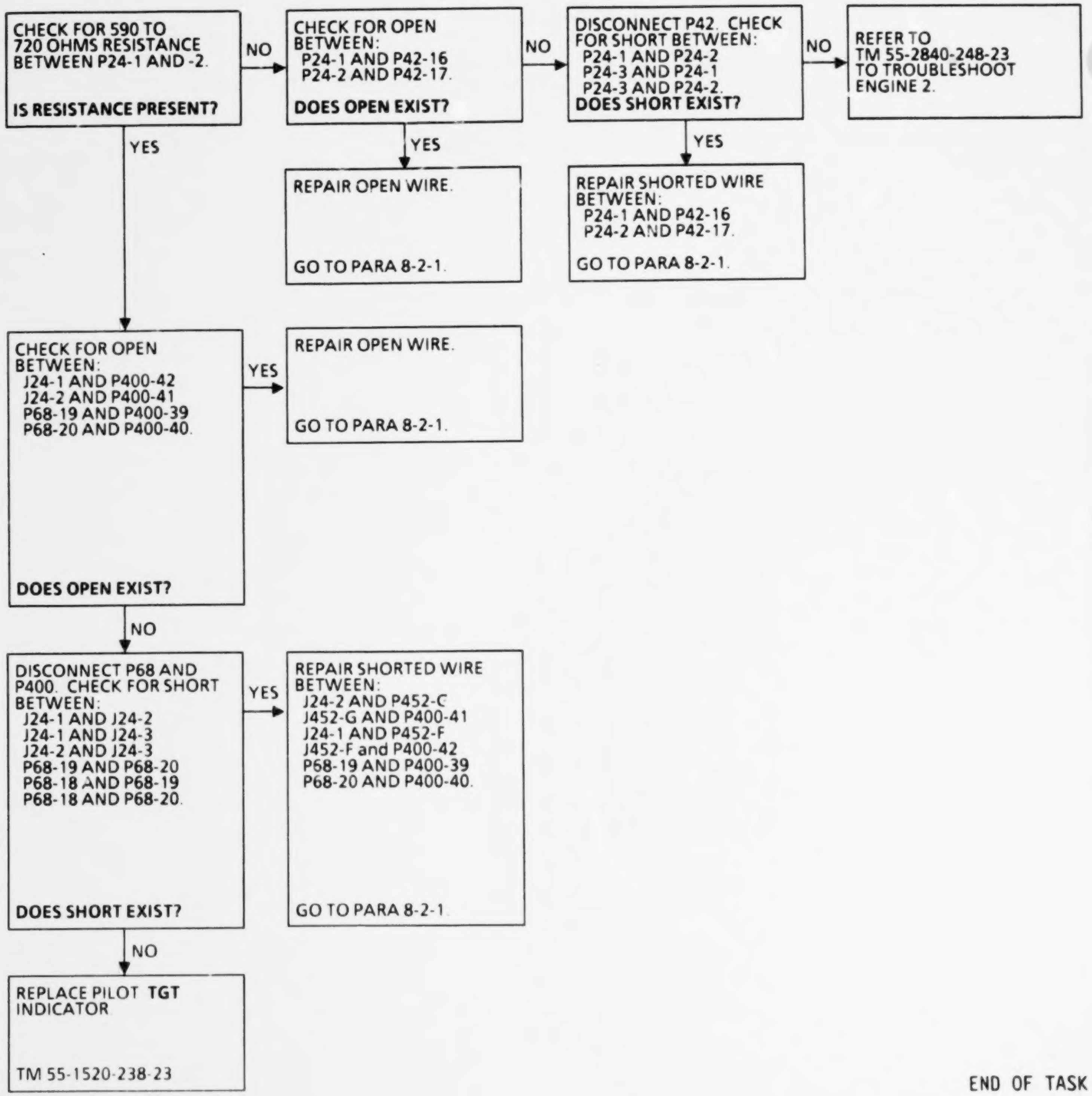
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	Access provisions - LN1 door opened



TGT INDICATOR

MM04/1-1551



CHECK FOR 590 TO 720 OHMS RESISTANCE BETWEEN P24-1 AND -2.

IS RESISTANCE PRESENT?

CHECK FOR OPEN BETWEEN:
P24-1 AND P42-16
P24-2 AND P42-17.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

DISCONNECT P42. CHECK FOR SHORT BETWEEN:
P24-1 AND P24-2
P24-3 AND P24-1
P24-3 AND P24-2.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P24-1 AND P42-16
P24-2 AND P42-17.

GO TO PARA 8-2-1.

REFER TO TM 55-2840-248-23 TO TROUBLESHOOT ENGINE 2.

CHECK FOR OPEN BETWEEN:
J24-1 AND P400-42
J24-2 AND P400-41
P68-19 AND P400-39
P68-20 AND P400-40.

DOES OPEN EXIST?

REPAIR OPEN WIRE.

GO TO PARA 8-2-1.

DISCONNECT P68 AND P400. CHECK FOR SHORT BETWEEN:
J24-1 AND J24-2
J24-1 AND J24-3
J24-2 AND J24-3
P68-19 AND P68-20
P68-18 AND P68-19
P68-18 AND P68-20.

DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
J24-2 AND P452-C
J452-G AND P400-41
J24-1 AND P452-F
J452-F and P400-42
P68-19 AND P400-39
P68-20 AND P400-40.

GO TO PARA 8-2-1.

REPLACE PILOT **TGT** INDICATOR

TM 55-1520-238-23

END OF TASK

8-2-88. CPG SELECTABLE DIGITAL DISPLAY PANEL - DOES NOT INDICATE ENGINE 1 AND/OR ENGINE 2 TGT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

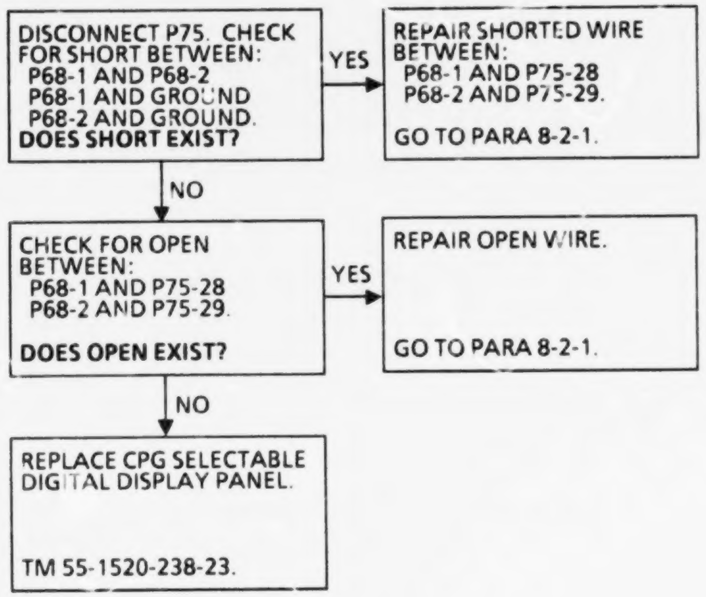
68F10 Aircraft Electrician

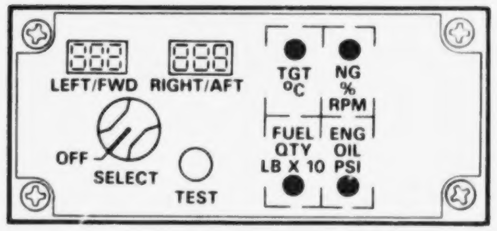
References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


DISCONNECT P75. CHECK FOR SHORT BETWEEN:
P68-1 AND P68-2
P68-1 AND GROUND
P68-2 AND GROUND.
DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN:
P68-1 AND P75-28
P68-2 AND P75-29.
GO TO PARA 8-2-1.
NO
CHECK FOR OPEN BETWEEN:
P68-1 AND P75-28
P68-2 AND P75-29.
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-2-1.
NO
REPLACE CPG SELECTABLE DIGITAL DISPLAY PANEL.
TM 55-1520-238-23.


LEFT/FWD
RIGHT/AFT
TGT °C
NG % RPM
FUEL QTY LB X 10
ENG OIL PSI
OFF
SELECT
TEST

CPG SELECTABLE DIGITAL DISPLAY PANEL

MM04/1-1552

END OF TASK

8-2-89. PILOT AND CPG TORQUE INDICATORS - DO NOT INDICATE ENGINE 1 TORQUE

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, Digital AN/PSM-45	6625-01-139-2512

Personnel Required:

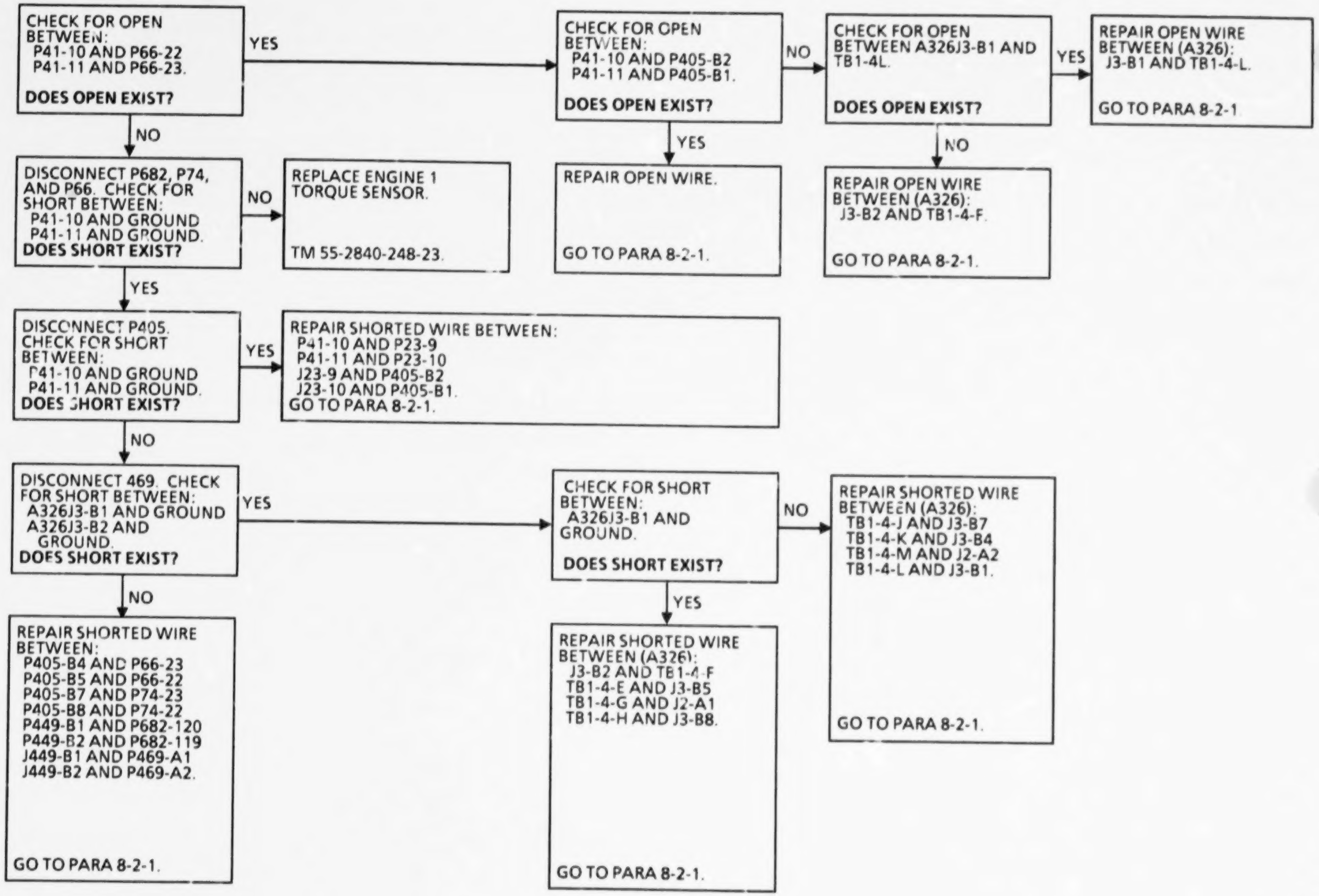
68F10 Aircraft Electrician

References:

TM 55-1520-238-23
TM 55-2840-248-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed Access provisions - LN1 door open


CHECK FOR OPEN BETWEEN: P41-10 AND P66-22 P41-11 AND P66-23. DOES OPEN EXIST?
YES
NO
CHECK FOR OPEN BETWEEN: P41-10 AND P405-B2 P41-11 AND P405-B1. DOES OPEN EXIST?
NO
YES
REPAIR OPEN WIRE. GO TO PARA 8-2-1.
CHECK FOR OPEN BETWEEN A326J3-B1 AND TB1-4L. DOES OPEN EXIST?
YES
NO
REPAIR OPEN WIRE BETWEEN (A326): J3-B1 AND TB1-4-L. GO TO PARA 8-2-1
REPAIR OPEN WIRE BETWEEN (A326): J3-B2 AND TB1-4-F. GO TO PARA 8-2-1.
DISCONNECT P682, P74, AND P66. CHECK FOR SHORT BETWEEN: P41-10 AND GROUND P41-11 AND GROUND. DOES SHORT EXIST?
NO
REPLACE ENGINE 1 TORQUE SENSOR. TM 55-2840-248-23.
YES
DISCONNECT P405. CHECK FOR SHORT BETWEEN: P41-10 AND GROUND P41-11 AND GROUND. DOES SHORT EXIST?
YES
REPAIR SHORTED WIRE BETWEEN: P41-10 AND P23-9 P41-11 AND P23-10 J23-9 AND P405-B2 J23-10 AND P405-B1. GO TO PARA 8-2-1.
NO
DISCONNECT 469. CHECK FOR SHORT BETWEEN: A326J3-B1 AND GROUND A326J3-B2 AND GROUND. DOES SHORT EXIST?
YES
CHECK FOR SHORT BETWEEN: A326J3-B1 AND GROUND. DOES SHORT EXIST?
NO
REPAIR SHORTED WIRE BETWEEN (A326): TB1-4-J AND J3-B7 TB1-4-K AND J3-B4 TB1-4-M AND J2-A2 TB1-4-L AND J3-B1. GO TO PARA 8-2-1.
YES
REPAIR SHORTED WIRE BETWEEN (A326): J3-B2 AND TB1-4-F TB1-4-E AND J3-B5 TB1-4-G AND J2-A1 TB1-4-H AND J3-B8. GO TO PARA 8-2-1.
NO
REPAIR SHORTED WIRE BETWEEN: P405-B4 AND P66-23 P405-B5 AND P66-22 P405-B7 AND P74-23 P405-B8 AND P74-22 P449-B1 AND P682-120 P449-B2 AND P682-119 J449-B1 AND P469-A1 J449-B2 AND P469-A2. GO TO PARA 8-2-1.

END OF TASK

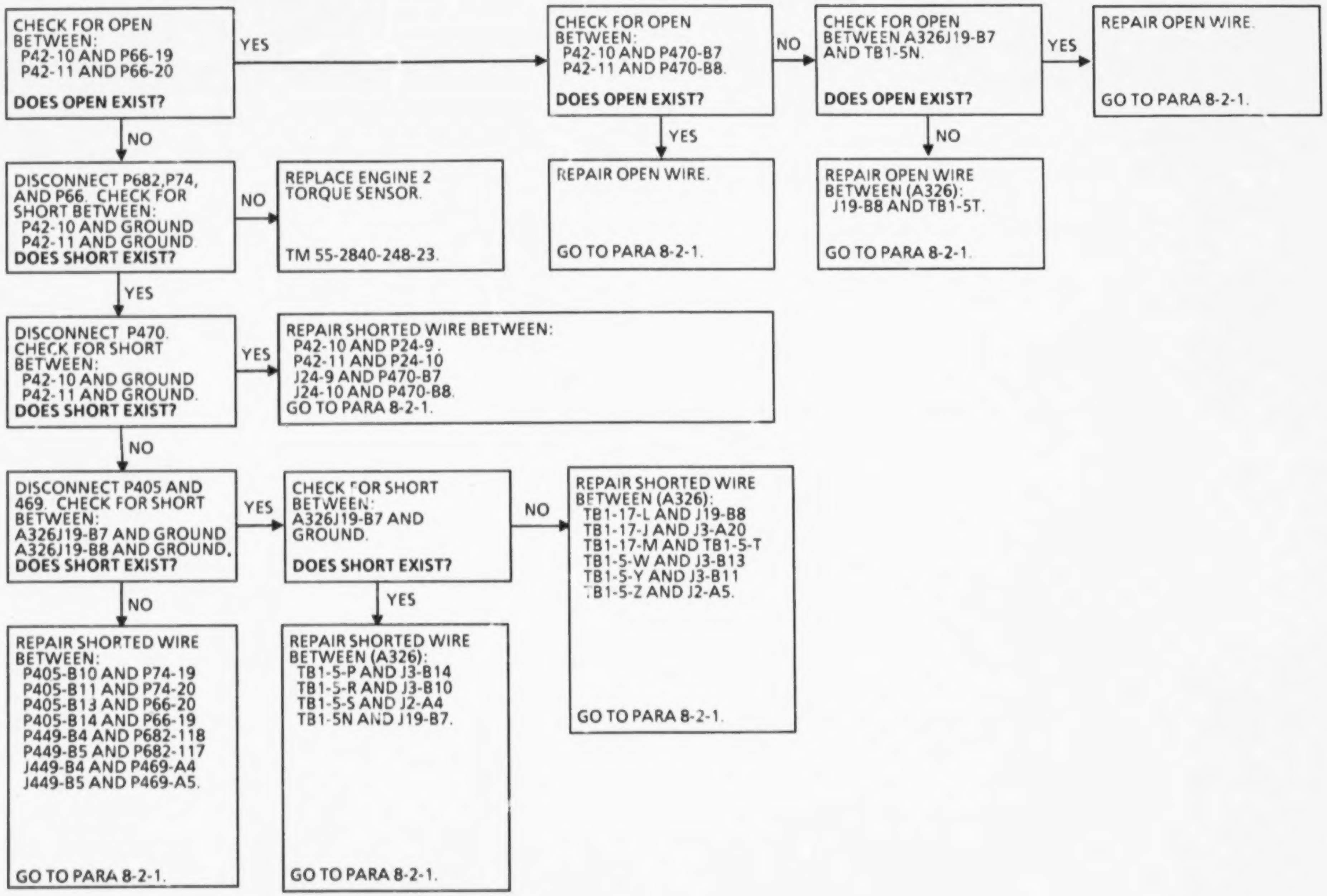
8-2-90. PILOT AND CPG TORQUE INDICATORS - DO NOT INDICATE ENGINE 2 TORQUE

Tools: (Para 8-2-89)

Personnel Required: (Para 8-2-89)

References: (Para 8-2-89)

Equipment Conditions: (Para 8-2-89)



CHECK FOR OPEN BETWEEN:
P42-10 AND P66-19
P42-11 AND P66-20
DOES OPEN EXIST?

CHECK FOR OPEN BETWEEN:
P42-10 AND P470-B7
P42-11 AND P470-B8.
DOES OPEN EXIST?

CHECK FOR OPEN BETWEEN A326J19-B7 AND TB1-5N.
DOES OPEN EXIST?

REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

REPAIR OPEN WIRE.
GO TO PARA 8-2-1.

REPAIR OPEN WIRE BETWEEN (A326):
J19-B8 AND TB1-5T.
GO TO PARA 8-2-1.

DISCONNECT P682, P74, AND P66. CHECK FOR SHORT BETWEEN:
P42-10 AND GROUND
P42-11 AND GROUND.
DOES SHORT EXIST?

REPLACE ENGINE 2 TORQUE SENSOR.
TM 55-2840-248-23.

DISCONNECT P470. CHECK FOR SHORT BETWEEN:
P42-10 AND GROUND
P42-11 AND GROUND.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN:
P42-10 AND P24-9.
P42-11 AND P24-10
J24-9 AND P470-B7
J24-10 AND P470-B8.
GO TO PARA 8-2-1.

DISCONNECT P405 AND 469. CHECK FOR SHORT BETWEEN:
A326J19-B7 AND GROUND
A326J19-B8 AND GROUND.
DOES SHORT EXIST?

CHECK FOR SHORT BETWEEN:
A326J19-B7 AND GROUND.
DOES SHORT EXIST?

REPAIR SHORTED WIRE BETWEEN (A326):
TB1-17-L AND J19-B8
TB1-17-J AND J3-A20
TB1-17-M AND TB1-5-T
TB1-5-W AND J3-B13
TB1-5-Y AND J3-B11
TB1-5-Z AND J2-A5.
GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN:
P405-B10 AND P74-19
P405-B11 AND P74-20
P405-B13 AND P66-20
P405-B14 AND P66-19
P449-B4 AND P682-118
P449-B5 AND P682-117
J449-B4 AND P469-A4
J449-B5 AND P469-A5.
GO TO PARA 8-2-1.

REPAIR SHORTED WIRE BETWEEN (A326):
TB1-5-P AND J3-B14
TB1-5-R AND J3-B10
TB1-5-S AND J2-A4
TB1-5N AND J19-B7.
GO TO PARA 8-2-1.

END OF TASK

8-3-1. FLIGHT INSTRUMENTS - OPERATIONAL CHECK

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tester, Pitot and Static System	4920-01-030-7569

Personnel Required:

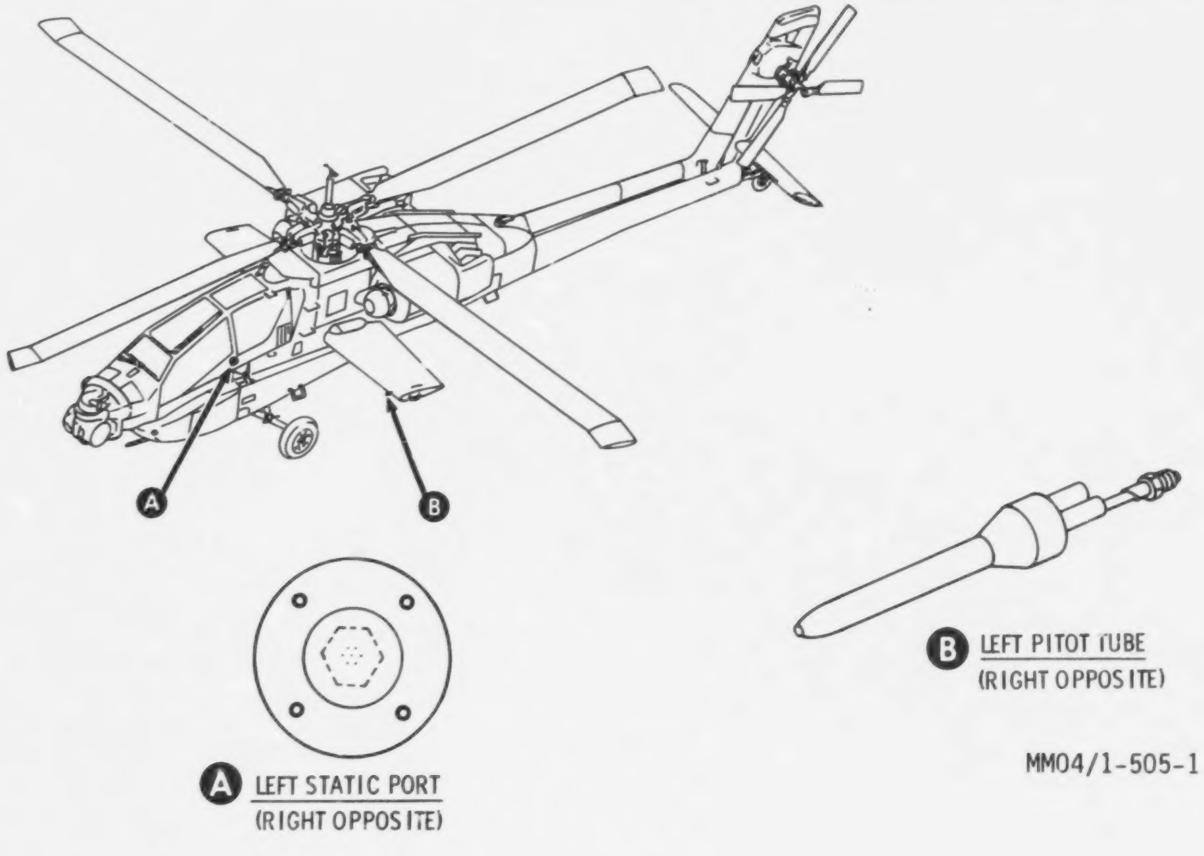
68F10	Aircraft Electrician One person to assist

References:

TM 55-1520-238-23
TM 55-1500-204-25/1

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical
Para 1-3-2	ICS connected
TM 55-1500-204-25/1	Pitot and static system tester connected


A
B
A LEFT STATIC PORT
(RIGHT OPPOSITE)
B LEFT PITOT TUBE
(RIGHT OPPOSITE)
MM04/1-505-1

8-3-1

WARNING

Do not apply pitot heat during this operation. To do so could result in severe burns to anyone touching the pitot tubes.

A. Perform visual check of pilot and CPG flight instruments (TM 55-1520-238-23).

B. Complete the operational check as follows:

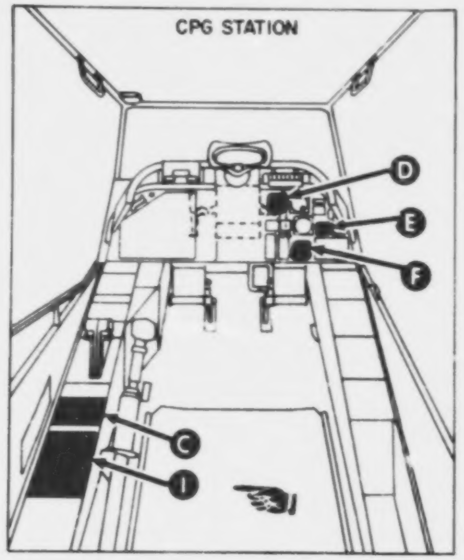
NOTE

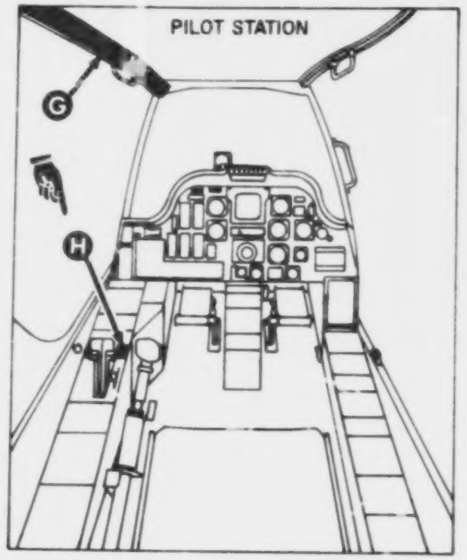
When operating the helicopter in high humidity, rapid change of temperature or at any time that link blockage is suspected, purge pitot and static system (TM 55-1500-204-25/1).

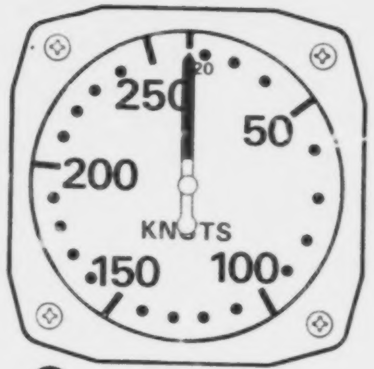
TASK	RESULT
1. Check left and right static ports.	If static port(s) are obstructed or dirty, clean static port(s) (TM 55-1500-204-25/1).
2. Remove covers from pitot tubes and check tubes.	If pitot tubes are obstructed or dirty clean tubes (TM 55-1500-204-25/1).
3. Drain pitot static system (TM 55-1520-238-23).	If excessive water is found at drain cock, purge system (TM 55-1500-204-25/1).
4. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **EXT PWR**.	
5. Check that **PRI LT** circuit breaker located on CPG circuit breaker panel is closed.	
6. Turn **INST** control on **CPG INTR LT** panel to **BRT**.	If CPG airspeed indicator, vertical speed indicator, and barometric altimeter edge-lights, do not light, refer to chapter 9 to troubleshoot. If CPG airspeed indicator edge-lighting does not light, go to para 8-3-4. If CPG vertical speed indicator edge-lighting does not light, go to para 8-3-5. If CPG barometric altimeter edge-lighting does not light, go to para 8-3-6.
7. Open **AIR DATA DC**, **AIR DATA AC**, and **STAB AUTO DC** circuit breakers on pilot circuit breaker panel.	

GO TO NEXT PAGE

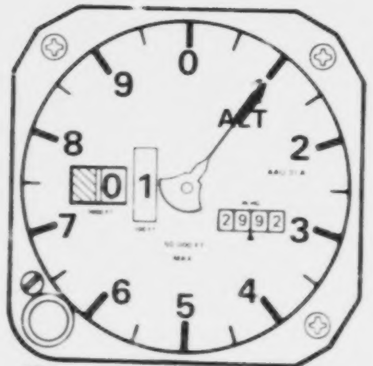
8-3-1. FLIGHT INSTRUMENTS - OPERATIONAL CHECK (cont)


CPG STATION
D
E
F
C
I

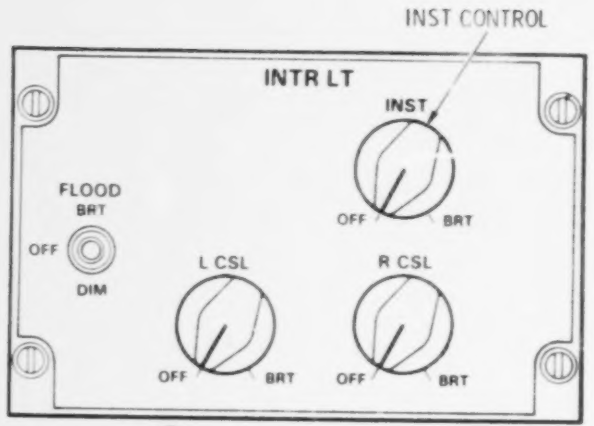

PILOT STATION
G
H


250
20
50
200
KNOTS
150
100

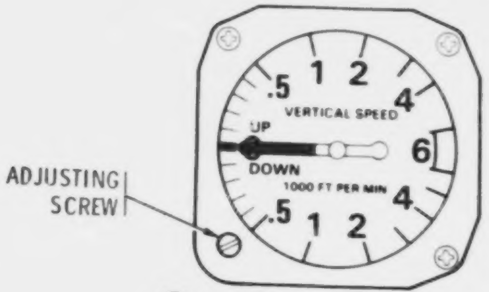
D AIRSPEED INDICATOR


0
1
2
3
4
5
6
7
8
9
ALT
2992

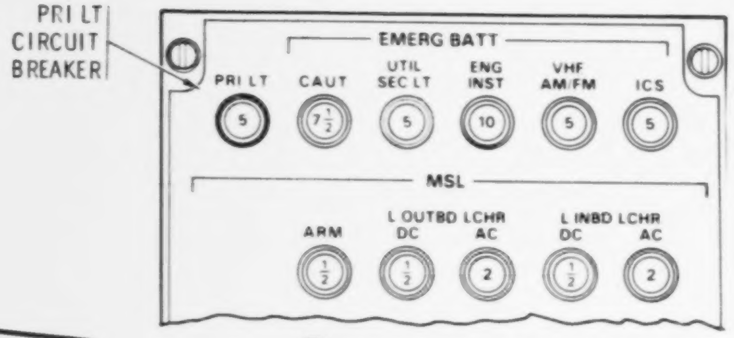
F BAROMETRIC ALTIMETER


INST CONTROL
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R CSL
OFF
BRT

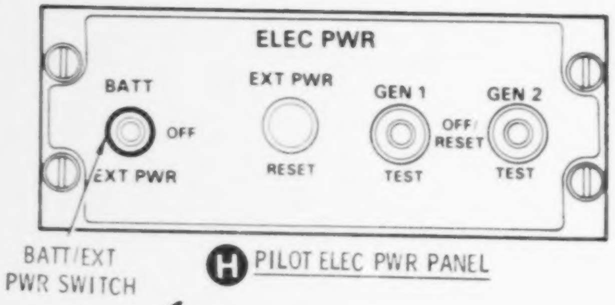
C CPG INTR LT PANEL


ADJUSTING SCREW
.5
1
2
4
6
VERTICAL SPEED
UP
DOWN
1000 FT PER MIN

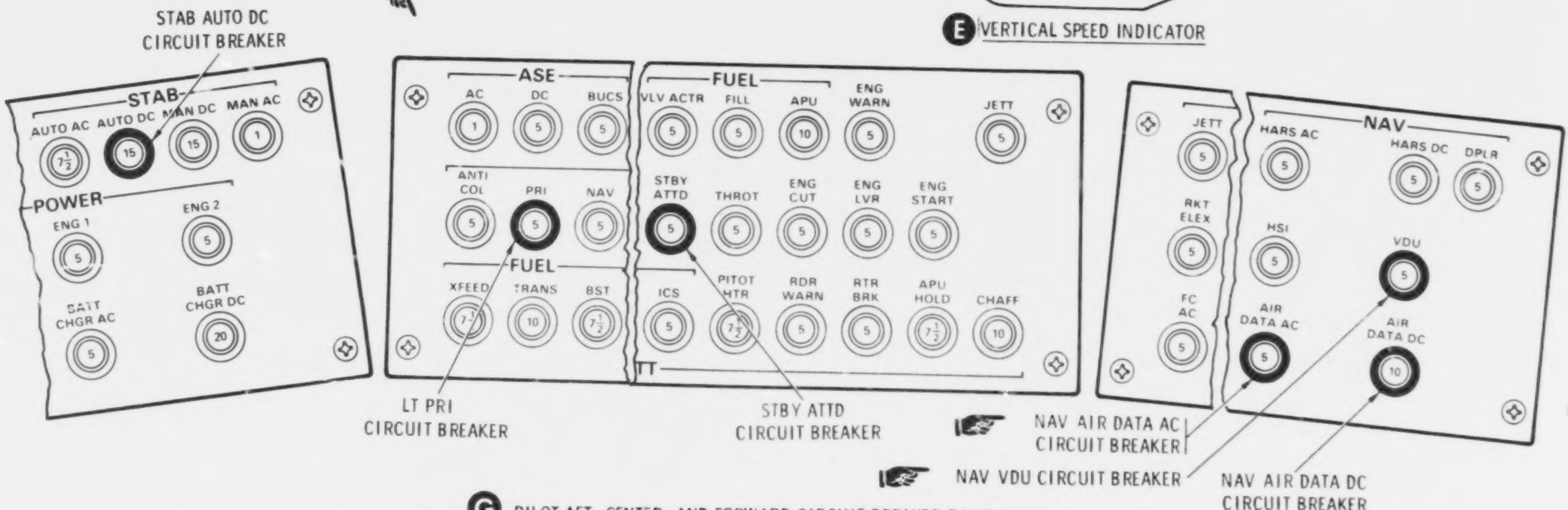
E VERTICAL SPEED INDICATOR


PRI LT CIRCUIT BREAKER
EMERG BATT
PRI LT
CAUT
UTIL SEC LT
ENG INST
VHF AM/FM
ICS
MSL
ARM
L OUTBD LCHR DC
AC
L INBD LCHR DC
AC

I CIRCUIT BREAKER PANEL NO. 1


ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
OFF/RESET
TEST
GEN 2
TEST
BATT/EXT PWR SWITCH

H PILOT ELEC PWR PANEL


STAB AUTO DC CIRCUIT BREAKER
STAB
AUTO AC
AUTO DC
MAN DC
MAN AC
POWER
ENG 1
ENG 2
BATT CHGR AC
BATT CHGR DC
ASE
AC
DC
BUCS
ANTI COL
PRI
NAV
FUEL
XFEED
TRANS
BST
FUEL
VLV ACTR
FILL
APU
ENG WARN
JETT
STBY ATTD
THROT
ENG CUT
ENG LVR
ENG START
ICS
PITOT HTR
RDR WARN
RTR BRK
APU HOLD
CHAFF
JETT
RKT ELEX
FC AC
NAV
HARS AC
HARS DC
DPLR
HSI
VDU
AIR DATA AC
AIR DATA DC
LT PRI CIRCUIT BREAKER
STBY ATTD CIRCUIT BREAKER
NAV AIR DATA AC CIRCUIT BREAKER
NAV VDU CIRCUIT BREAKER
NAV AIR DATA DC CIRCUIT BREAKER

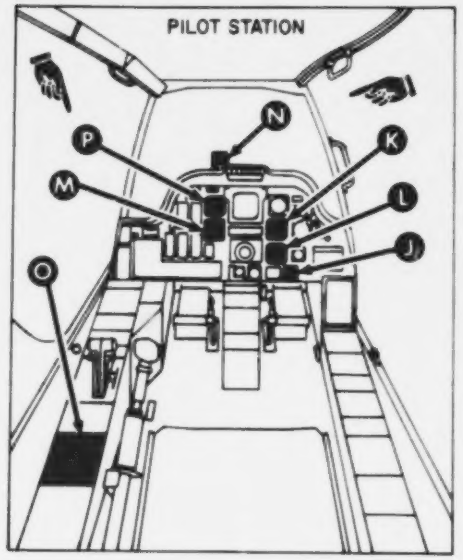
G PILOT AFT, CENTER, AND FORWARD CIRCUIT BREAKER PANELS

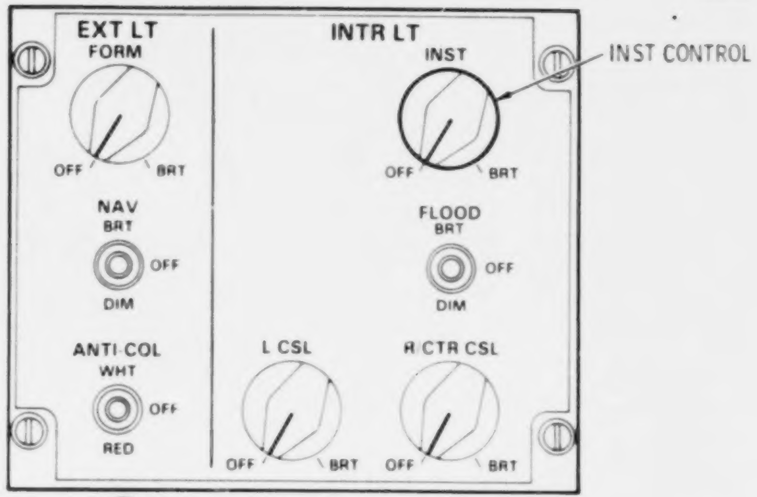
MM04/1-505-2D

GO TO NEXT PAGE

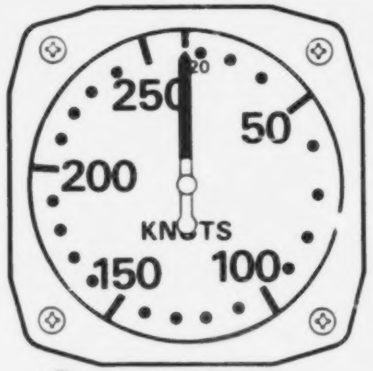
8-3-1. FLIGHT INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
8. Check that **LT PRI** circuit breaker on pilot circuit breaker panel is closed.	
9. Turn **INST** control on pilot **EXT LT/INTR LT** panel to **BRT**.	If vertical speed, accelerometer indicators and barometric altimeter edge-lights do not light, refer to Chapter 9 to troubleshoot pilot edge-lighting. If magnetic compass, airspeed and standby attitude indicators edge-lights do not light, refer to Chapter 9 to troubleshoot pilot edge-lighting. If pilot airspeed indicator edge-lighting does not light, go to para 8-3-7. If pilot accelerometer indicator edge-lighting does not light, go to para 8-3-8. If pilot barometric altimeter edge-lighting does not light, go to para 8-3-9. If pilot vertical speed indicator edge-lighting does not light, go to para 8-3-10. If pilot standby attitude indicator edge-lighting does not light, go to para 8-3-11. If pilot magnetic compass edge-lighting does not light, go to para 8-3-10C.
10. Turn and release **PULL TO CAGE** knob to pilot standby attitude indicator then turn knob clockwise and counterclockwise.	If fixed aircraft symbol does not move up and down on face of gyrosphere, replace standby attitude indicator (TM 55-1520-238-23).
11. Check that **STBY ATTD** circuit breaker on pilot circuit breaker panel is closed.	
12. Check **OFF** flag on standby attitude indicator.	If **OFF** flag is visible, go to para 8-3-12.

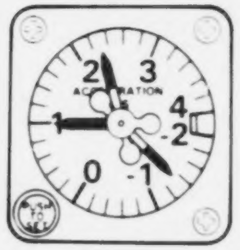

PILOT STATION
N
P
K
M
L
J
O


EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R CTR CSL
OFF
BRT
INST CONTROL

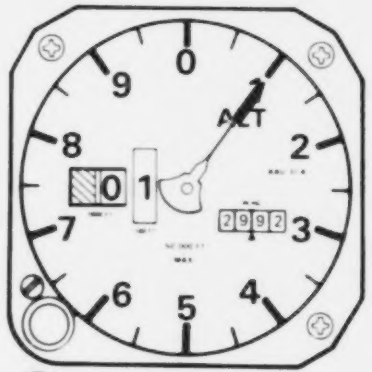
O PILOT EXT LT/INTR LT PANEL


250
50
200
KNOTS
150
100

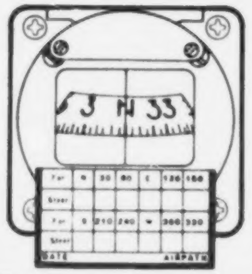
P AIRSPEED INDICATOR


2
3
1
4
-2
0
-1
ACCELERATION

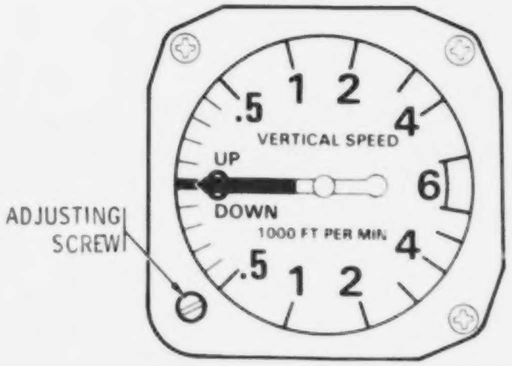
J ACCELEROMETER INDICATOR


0
1
ALT
2
3
4
5
6
7
8
9
2992

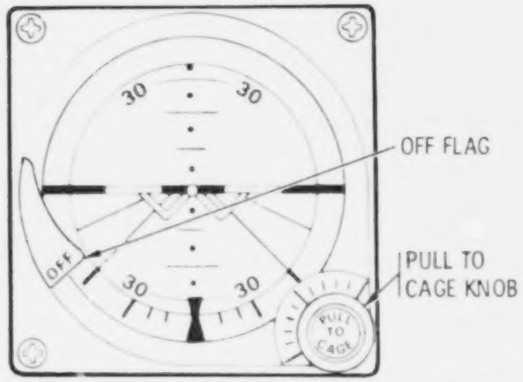
K BAROMETRIC ALTIMETER


3
N
33
DATE
AIRPATH

N MAGNETIC COMPASS


.5
1
2
4
VERTICAL SPEED
UP
6
DOWN
1000 FT PER MIN
.5
1
2
4
ADJUSTING SCREW

L VERTICAL SPEED INDICATOR


30
30
OFF
30
30
PULL TO CAGE
OFF FLAG
PULL TO CAGE KNOB

M STANDBY ATTITUDE INDICATOR

MM04/1-505-3D

GO TO NEXT PAGE

8-3-1. FLIGHT INSTRUMENTS - OPERATIONAL CHECK (cont)

TASK	RESULT
13. Pull and turn **PULL TO CAGE** knob on pilot standby attitude indicator. Check **OFF** flag on standby attitude indicator.	If **OFF** flag is not visible, replace pilot standby attitude indicator (TM 55-1520-238-23).
14. On pilot vertical speed indicator, set indicator to **0 FPM** using adjust screw on face of indicator.	If vertical speed indicator does not adjust to **0 FPM**, replace pilot vertical speed indicator (TM 55-1520-238-23).
15. On CPG vertical speed indicator, set indicator to **0 FPM** using adjust screw on face of indicator.	If vertical speed indicator does not adjust to **0 FPM**, replace CPG vertical speed indicator (TM 55-1520-238-23).
15.1 Check that **VDU** circuit breaker located on pilot forward circuit breaker panel is closed.	If circuit breaker does not stay closed, troubleshoot VDU electrical system (TM 11-1520-238-23-2). If the internal vibrator in the pilot barometric altimeter is not heard, go to para 8-3-10A. If the internal vibrator in the CPG barometric altimeter is not heard, go to para 8-3-10B.
16. Compare pilot barometric altimeter indicator reading to test site ambient barometric pressure (reading obtained from control tower).	If barometric altimeter indicator pressure reading is not ±70 feet of ambient pressure, check the barometric altimeter (TM 55-1500-204-25/1) and replace pilot barometric altimeter (TM 55-1520-238-23) if tolerances exceeded.
17. Compare CPG barometric altimeter indicator reading to test site ambient barometric pressure reading.	If barometric altimeter indicator pressure reading is not ±70 feet of ambient pressure, check the barometric altimeter (TM 55-1500-204-25/1) and replace CPG barometric altimeter (TM 55-1520-238-23) if tolerances exceeded.
18. Perform pitot and static port system, line, leak check (TM 55-1500-204-25/1).	Replace any component(s) that failed leak check (TM 55-1520-238-23).

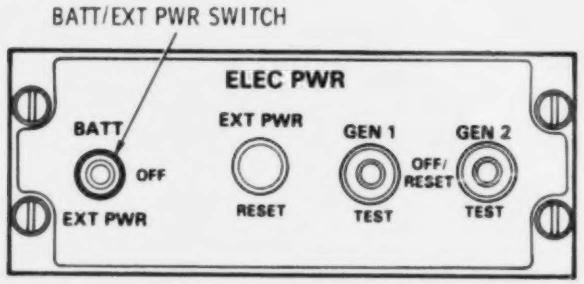
C. Turn **INST** control on CPG **INTR LT** panel to **OFF**.

D. Turn **INST** control on pilot **EXT LT/INTR LT** panel to **OFF**.

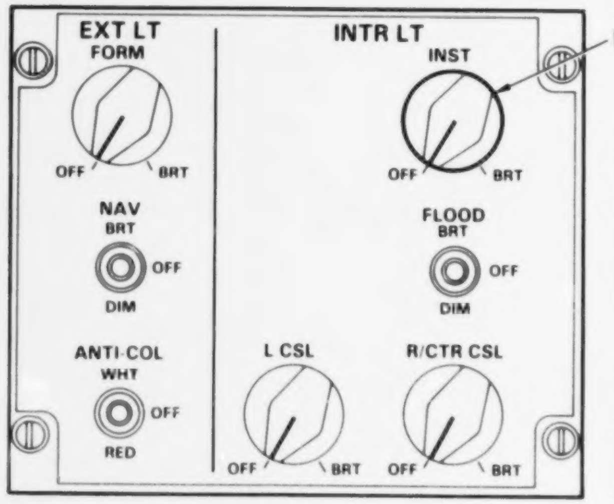
E. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **OFF**.

F. Shutdown and disconnect GPU from helicopter (TM 55-1520-238-23).

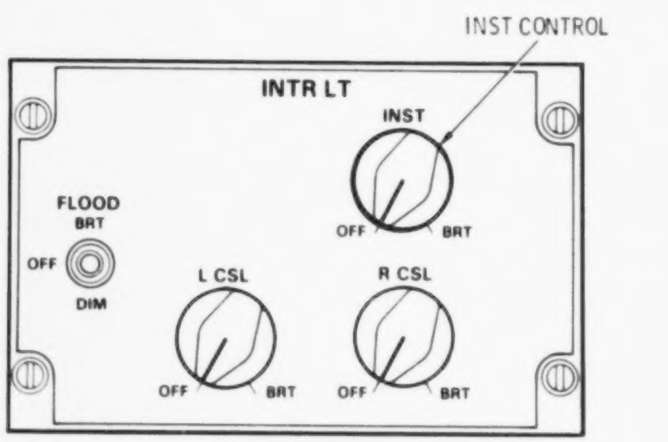
G. Remove pitot and static system tester (TM 55-1500-204-25/1).


BATT/EXT PWR SWITCH
ELEC PWR
BATT
OFF
EXT PWR
EXT PWR
RESET
GEN 1
TEST
OFF/RESET
GEN 2
TEST

PILOT ELEC PWR PANEL


EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI-COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
INST CONTROL
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R/CTR CSL
OFF
BRT

PILOT EXT LT/ INTR LT PANEL

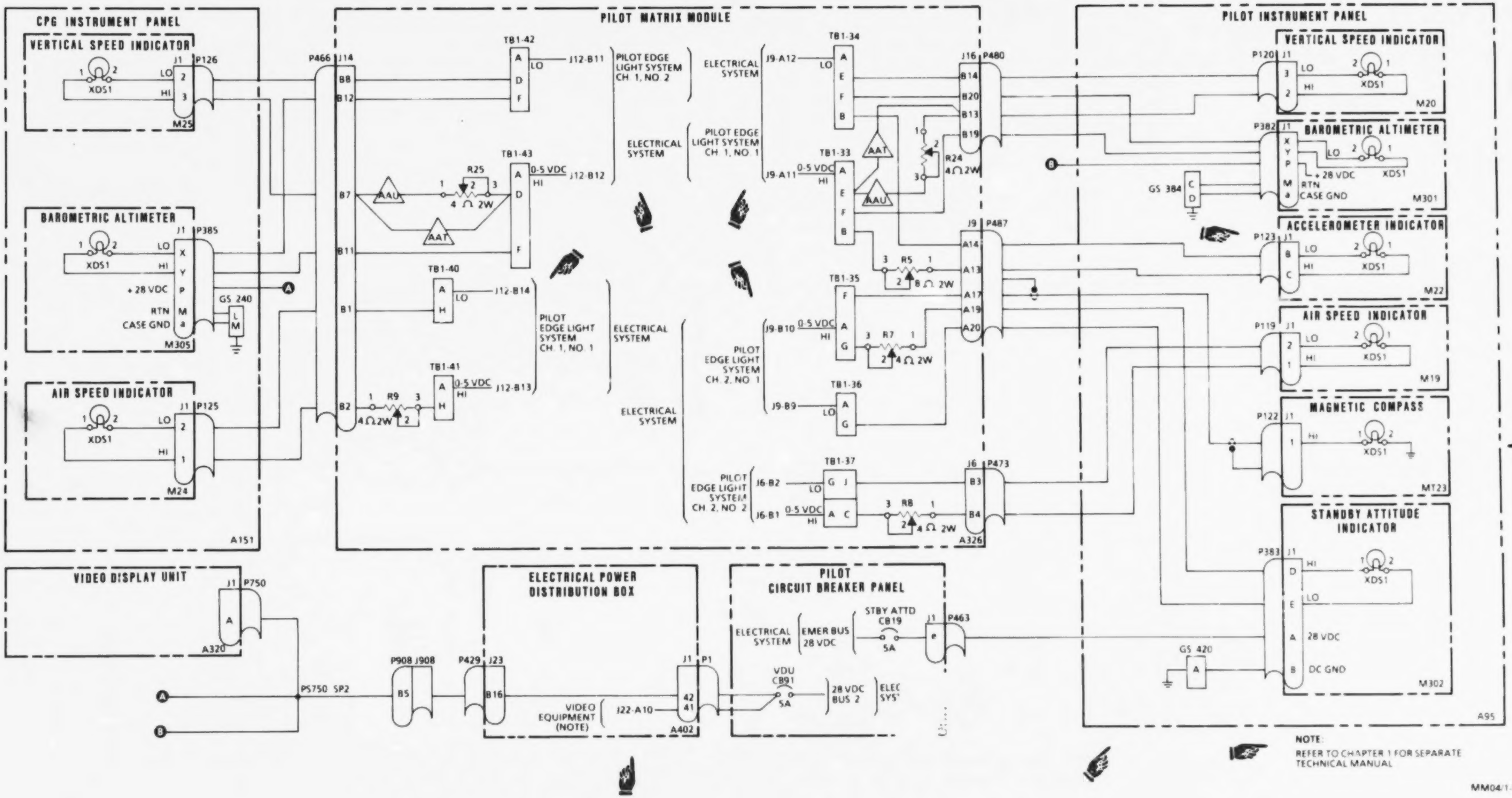

INST CONTROL
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
OFF
BRT
R CSL
OFF
BRT

CPG INTR LT PANEL

MM04/1-505-4A

END OF TASK

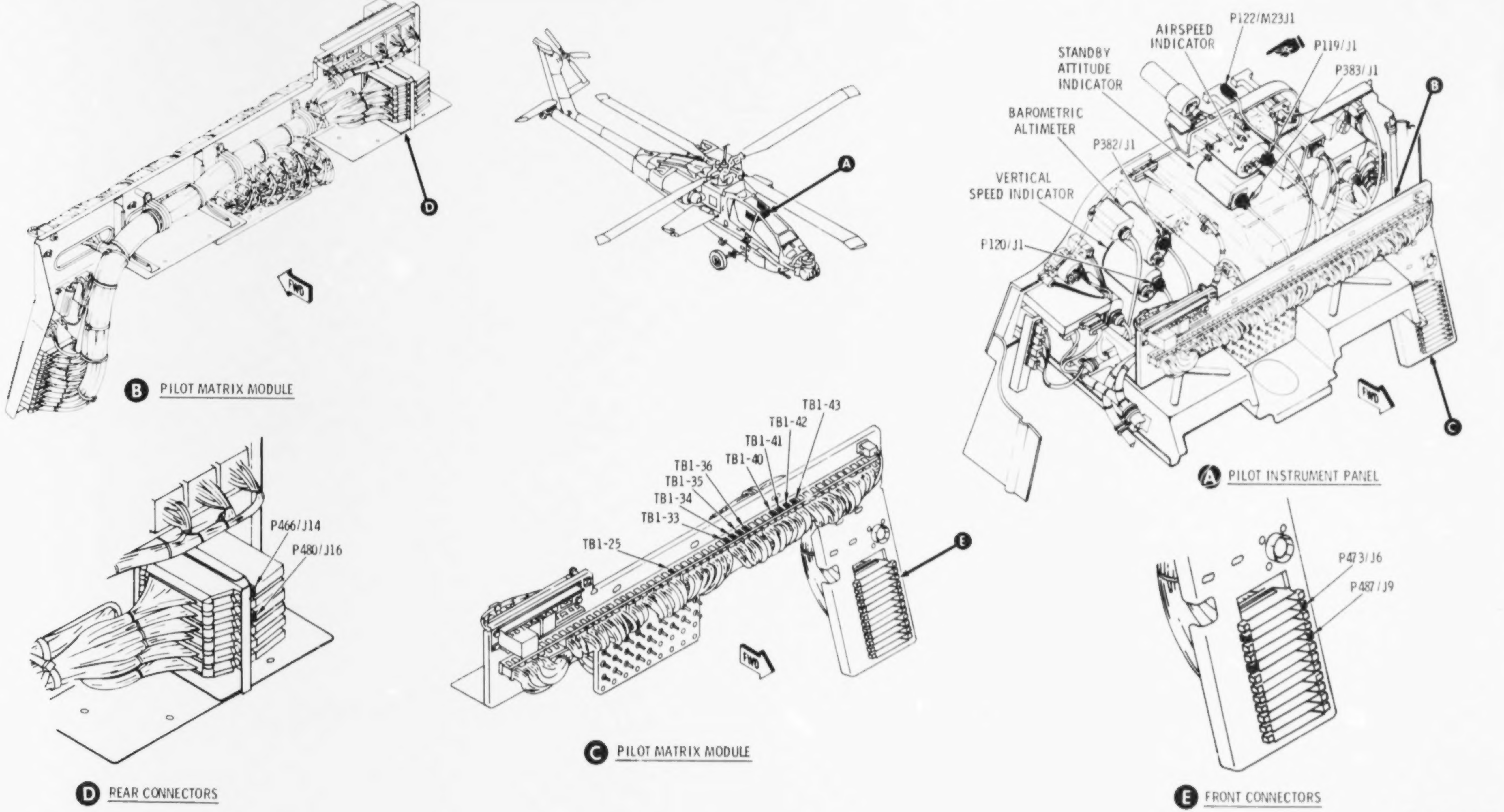
8-3-2. FLIGHT INSTRUMENTS - INTERCONNECTION DIAGRAM


CPG INSTRUMENT PANEL
VERTICAL SPEED INDICATOR
J1 P126
XDS1
LO HI
M25
BAROMETRIC ALTIMETER
J1 P385
LO HI +28 VDC RTN CASE GND
X Y P M a
GS 240
L M
M305
AIR SPEED INDICATOR
J1 P125
M24
A151
PILOT MATRIX MODULE
P466 J14
B8 B12 B7 B11 B1 B2
TB1-42
J12-B11
PILOT EDGE LIGHT SYSTEM CH 1, NO 2
TB1-43
R25
4 Ω 2W
0-5 VDC
J12-B12
AAU
AAT
TB1-40
J12-B14
PILOT EDGE LIGHT SYSTEM CH 1, NO 1
TB1-41
J12-B13
R9
4 Ω 2W
ELECTRICAL SYSTEM
TB1-34
J9-A12
TB1-33
J9-A11
R24
4 Ω 2W
TB1-35
R5
8 Ω 2W
J9-B10
R7
4 Ω 2W
PILOT EDGE LIGHT SYSTEM CH 2, NO 1
TB1-36
J9-B9
TB1-37
J6-B2
J6-B1
R8
4 Ω 2W
PILOT EDGE LIGHT SYSTEM CH 2, NO 2
J16 P480
B14 B20 B13 B19
J9 P487
A14 A13 A17 A19 A20
J6 P473
B3 B4
A326
PILOT INSTRUMENT PANEL
VERTICAL SPEED INDICATOR
P120 J1
M20
BAROMETRIC ALTIMETER
P382 J1
GS 384
M301
ACCELEROMETER INDICATOR
P123 J1
M22
AIR SPEED INDICATOR
P119 J1
M19
MAGNETIC COMPASS
P122 J1
MT23
STANDBY ATTITUDE INDICATOR
P383 J1
D E A B
HI LO 28 VDC DC GND
GS 420
M302
A95
VIDEO DISPLAY UNIT
J1 P750
A320
PS750 SP2
P908 J908
B5
P429 J23
B16
ELECTRICAL POWER DISTRIBUTION BOX
VIDEO EQUIPMENT (NOTE)
J22-A10
J1 P1
42 41
A402
PILOT CIRCUIT BREAKER PANEL
ELECTRICAL SYSTEM
EMER BUS 28 VDC
STBY ATTD CB19 5A
J1 P463
VDU CB91 5A
28 VDC BUS 2
ELEC SYS
A
B

NOTE:
REFER TO CHAPTER 1 FOR SEPARATE TECHNICAL MANUAL

MM04/1-507I

8-3-3. FLIGHT INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION


FWD
D
A
AIRSPEED INDICATOR
P122/M23J1
P119/J1
P383/J1
STANDBY ATTITUDE INDICATOR
BAROMETRIC ALTIMETER
P382/J1
VERTICAL SPEED INDICATOR
P120/J1
B
C
P466/J14
P480/J16
TB1-43
TB1-42
TB1-41
TB1-40
TB1-36
TB1-35
TB1-34
TB1-33
TB1-25
E
P473/J6
P487/J9

B PILOT MATRIX MODULE

A PILOT INSTRUMENT PANEL

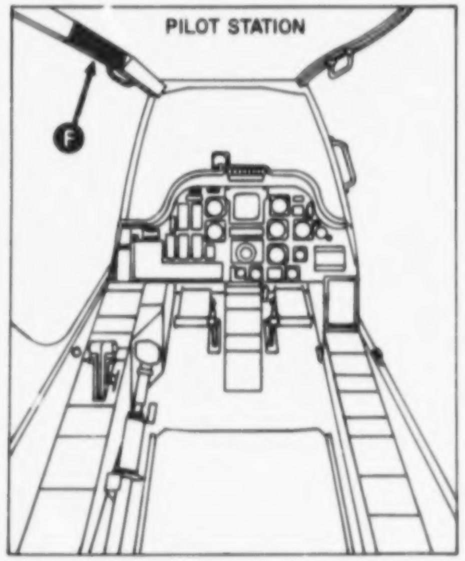
D REAR CONNECTORS

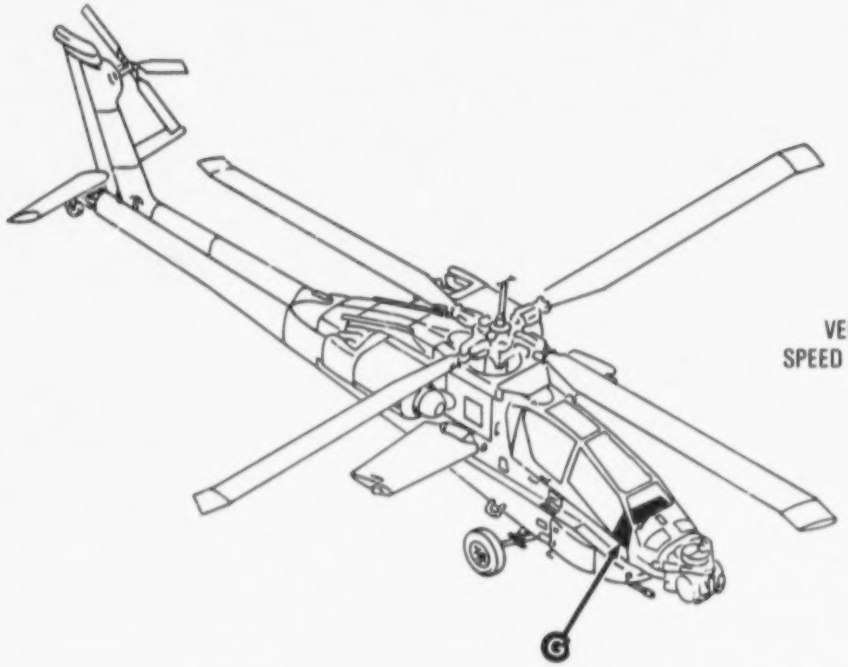
C PILOT MATRIX MODULE

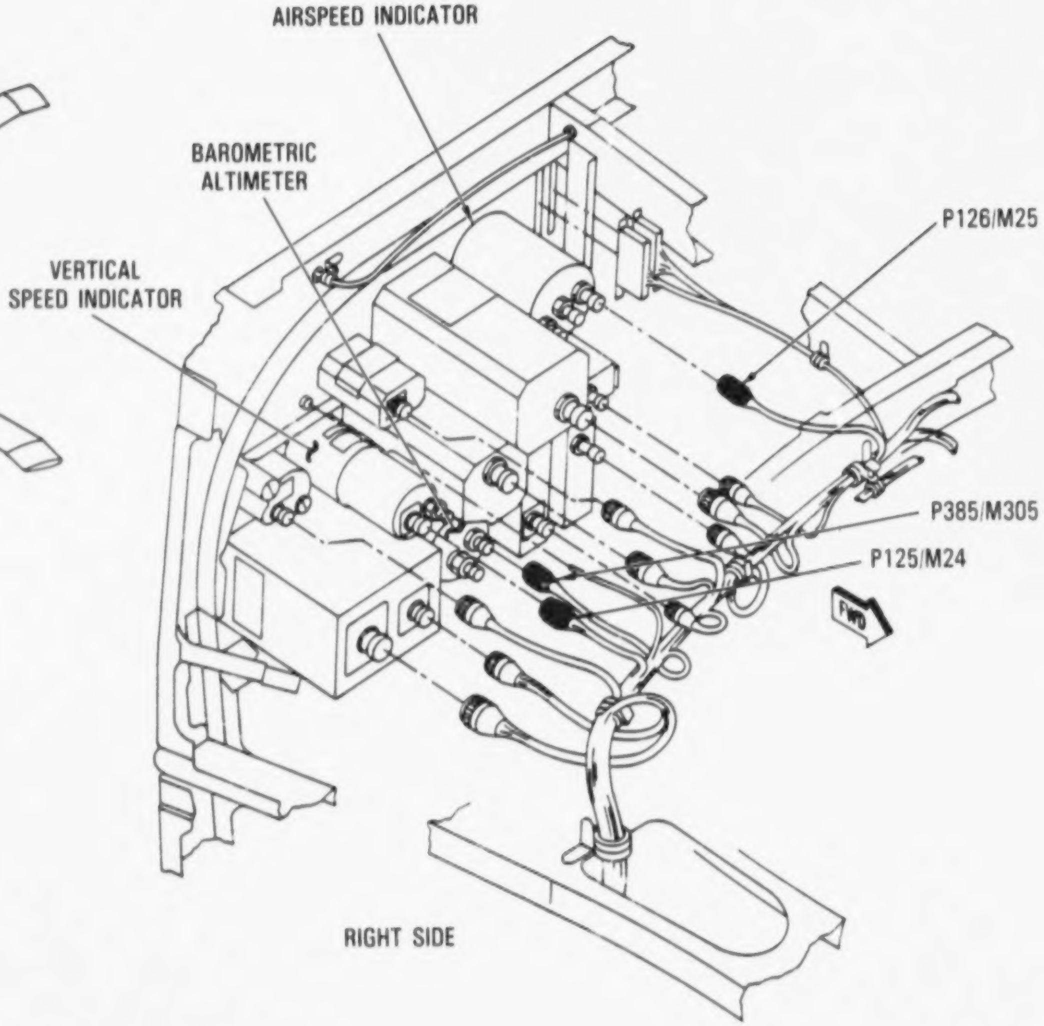
E FRONT CONNECTORS

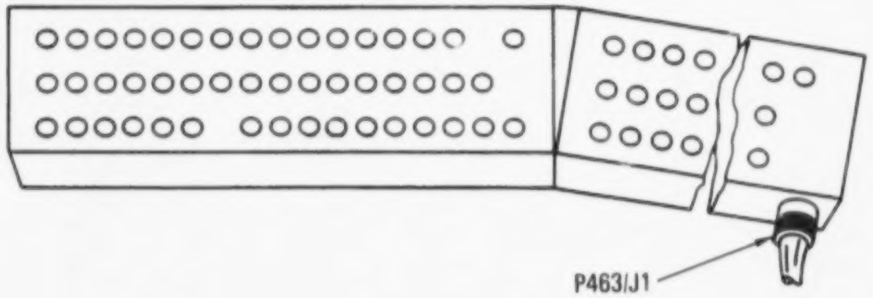
MM04/1-1285-1B

8-3-3. FLIGHT INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)


PILOT STATION
F




AIRSPEED INDICATOR
BAROMETRIC ALTIMETER
VERTICAL SPEED INDICATOR
P126/M25
P385/M305
P125/M24
FWD
RIGHT SIDE



F PILOT CENTER AND FORWARD CIRCUIT BREAKER PANEL

G CPG INSTRUMENT PANEL

MM04/1-1285-2

8-3-4. CPG AIRSPEED INDICATOR EDGE-LIGHTING - DOES NOT COME ON

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Electronic-Equipment Maintenance	5180-00-234-8913
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

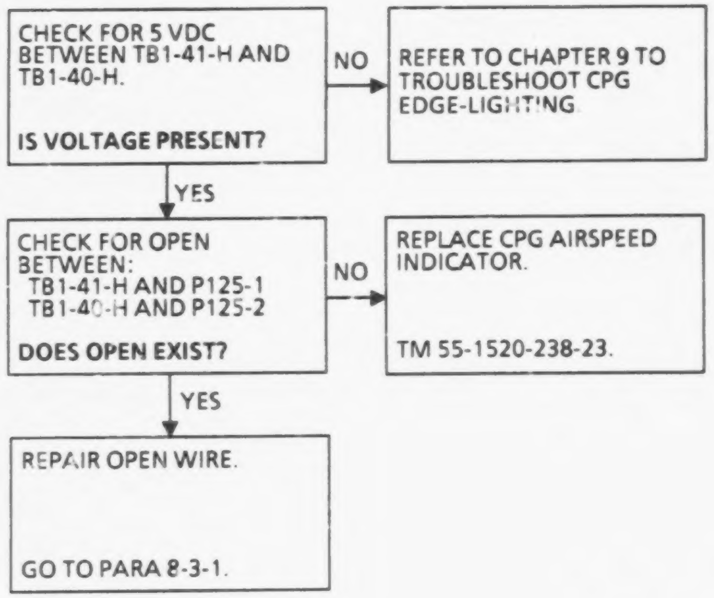
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR 5 VDC BETWEEN TB1-41-H AND TB1-40-H.

IS VOLTAGE PRESENT?

NO: REFER TO CHAPTER 9 TO TROUBLESHOOT CPG EDGE-LIGHTING.

YES: CHECK FOR OPEN BETWEEN:
TB1-41-H AND P125-1
TB1-40-H AND P125-2

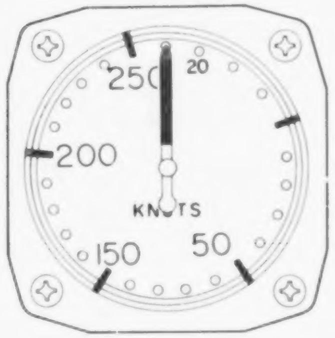
DOES OPEN EXIST?

NO: REPLACE CPG AIRSPEED INDICATOR.

TM 55-1520-238-23.

YES: REPAIR OPEN WIRE.

GO TO PARA 8-3-1.



CPG AIRSPEED INDICATOR

MM04/1-508-1A

END OF TASK

8-3-5. CPG VERTICAL SPEED INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-3-4)

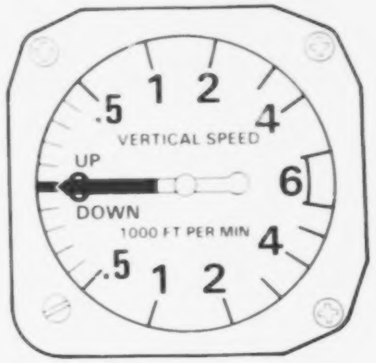
Personnel Required: (para 8-3-4)

References: (para 8-3-4)

Equipment Conditions: (para 8-3-4)

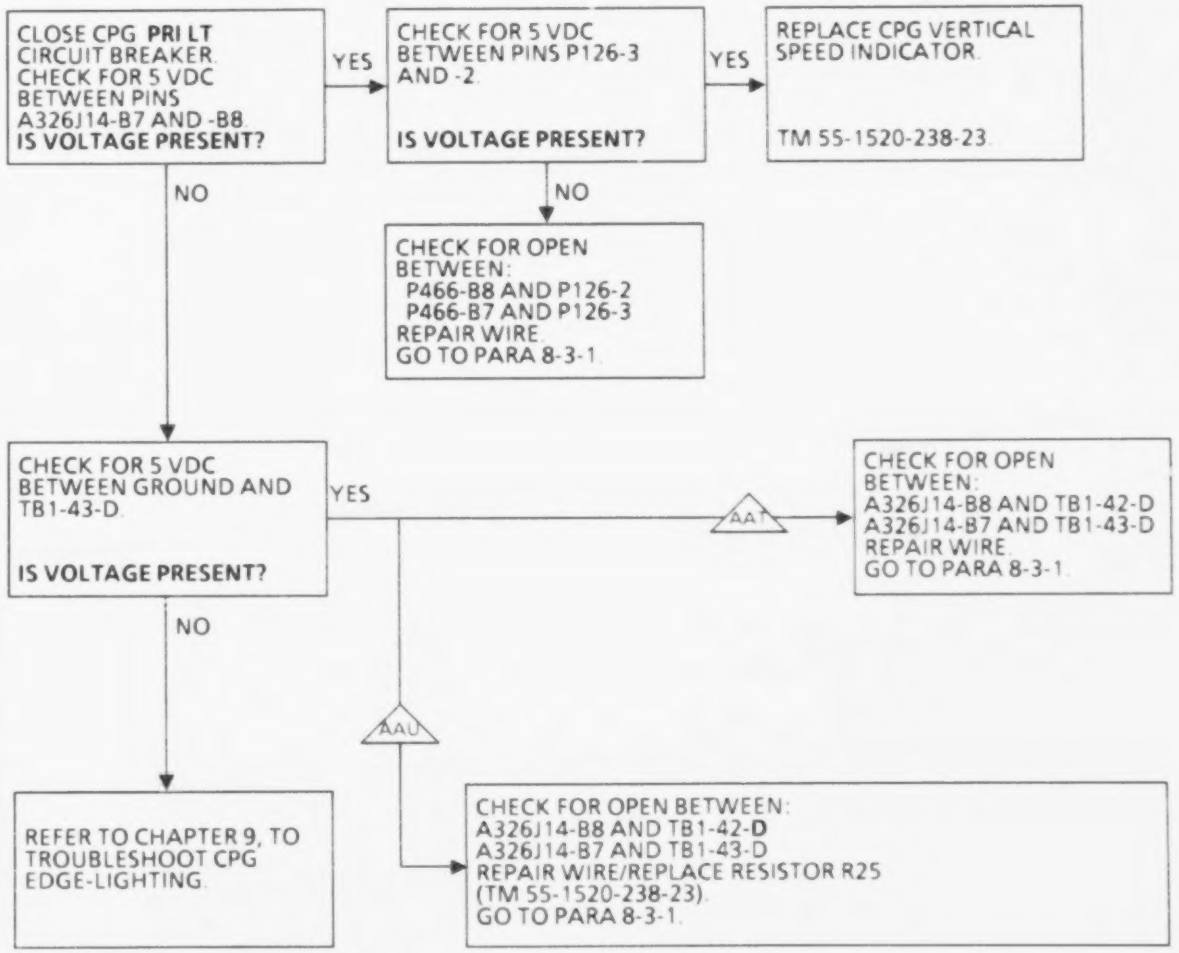
WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CPG VERTICAL SPEED INDICATOR

MM04/1-508-2B



CLOSE CPG PRI LT CIRCUIT BREAKER. CHECK FOR 5 VDC BETWEEN PINS A326J14-B7 AND -B8.

IS VOLTAGE PRESENT?

YES: CHECK FOR 5 VDC BETWEEN PINS P126-3 AND -2.

IS VOLTAGE PRESENT?

YES: REPLACE CPG VERTICAL SPEED INDICATOR.

TM 55-1520-238-23.

NO: CHECK FOR OPEN BETWEEN:
P466-B8 AND P126-2
P466-B7 AND P126-3
REPAIR WIRE.
GO TO PARA 8-3-1.

NO: CHECK FOR 5 VDC BETWEEN GROUND AND TB1-43-D.

IS VOLTAGE PRESENT?

YES (AAT): CHECK FOR OPEN BETWEEN:
A326J14-B8 AND TB1-42-D
A326J14-B7 AND TB1-43-D
REPAIR WIRE.
GO TO PARA 8-3-1.

YES (AAU): CHECK FOR OPEN BETWEEN:
A326J14-B8 AND TB1-42-D
A326J14-B7 AND TB1-43-D
REPAIR WIRE/REPLACE RESISTOR R25
(TM 55-1520-238-23).
GO TO PARA 8-3-1.

NO: REFER TO CHAPTER 9, TO TROUBLESHOOT CPG EDGE-LIGHTING.

END OF TASK

8-3-6. CPG BAROMETRIC ALTIMETER EDGE-LIGHTING - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Electronic Equipment Maintenance	5180-00-234-8913
Multimeter AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

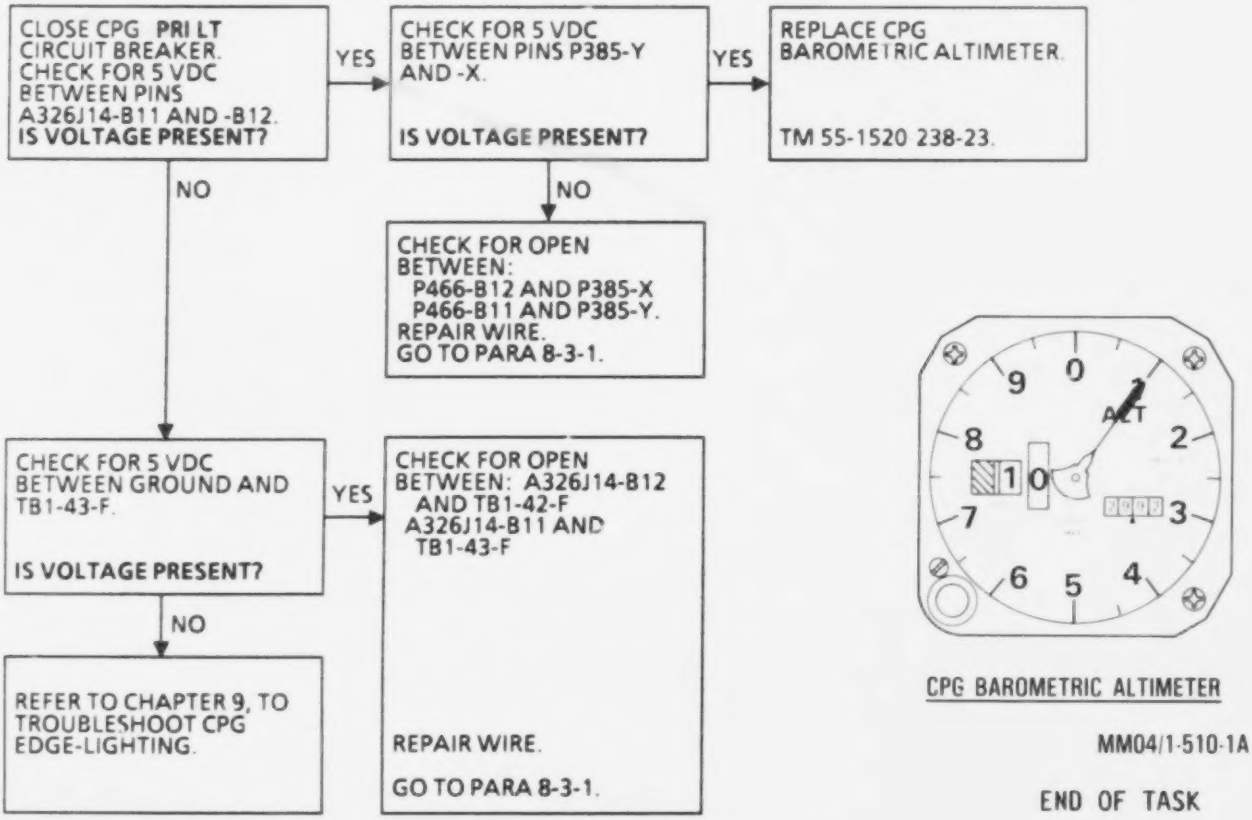
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed External power application - Electrical Nontransparent barrier removed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CLOSE CPG PRI LT CIRCUIT BREAKER. CHECK FOR 5 VDC BETWEEN PINS A326J14-B11 AND -B12. **IS VOLTAGE PRESENT?**

CHECK FOR 5 VDC BETWEEN PINS P385-Y AND -X. **IS VOLTAGE PRESENT?**

REPLACE CPG BAROMETRIC ALTIMETER. TM 55-1520 238-23.

CHECK FOR OPEN BETWEEN: **P466-B12 AND P385-X P466-B11 AND P385-Y.** REPAIR WIRE. GO TO PARA 8-3-1.

CHECK FOR 5 VDC BETWEEN GROUND AND TB1-43-F. **IS VOLTAGE PRESENT?**

CHECK FOR OPEN BETWEEN: A326J14-B12 AND TB1-42-F A326J14-B11 AND TB1-43-F. REPAIR WIRE. GO TO PARA 8-3-1.

REFER TO CHAPTER 9, TO TROUBLESHOOT CPG EDGE-LIGHTING.

CPG BAROMETRIC ALTIMETER

MM04/1-510-1A

END OF TASK

8-3-7. PILOT AIRSPEED INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-3-6)

Personnel Required: (para 8-3-6)

References: (para 8-3-6)

Equipment Conditions: (para 8-3-6)

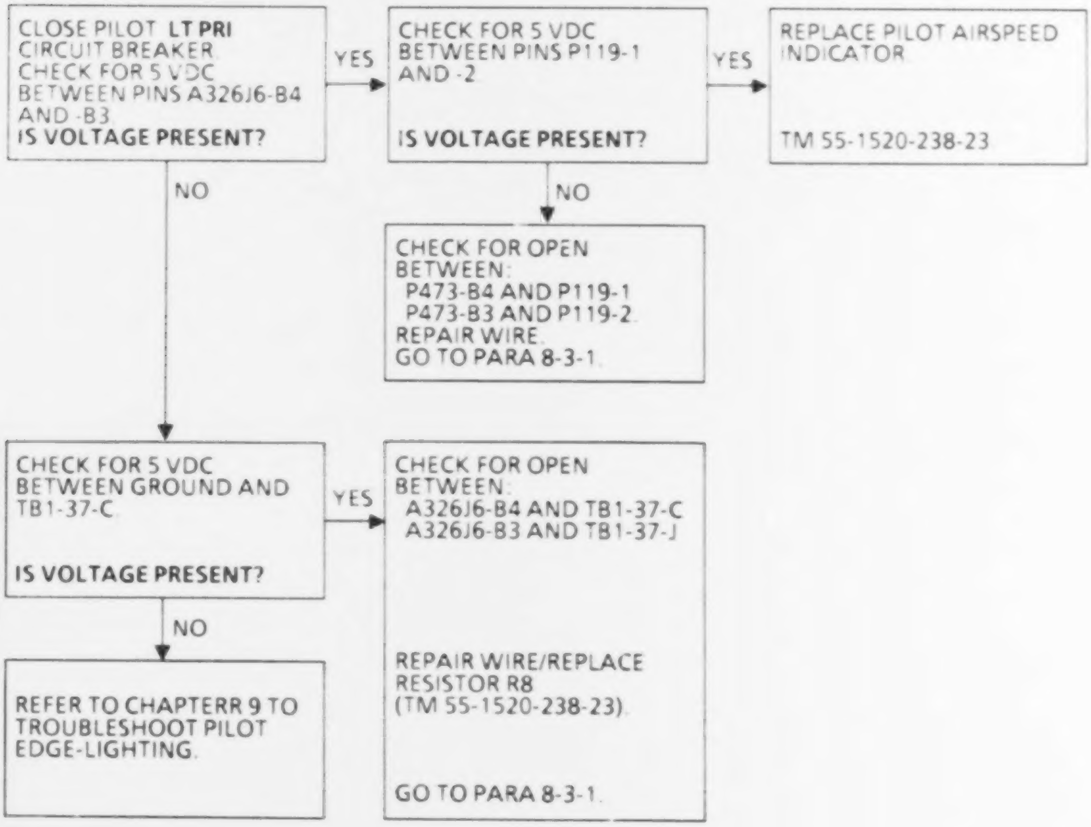
250
20
200
KNOTS
150
50

PILOT AIRSPEED INDICATOR

MM04/1-510-2A

WARNING

Turn off power before disconnecting or reconnecting wires and connectors.
High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CLOSE PILOT LT PRI CIRCUIT BREAKER. CHECK FOR 5 VDC BETWEEN PINS A326J6-B4 AND -B3. IS VOLTAGE PRESENT?
YES
CHECK FOR 5 VDC BETWEEN PINS P119-1 AND -2. IS VOLTAGE PRESENT?
YES
REPLACE PILOT AIRSPEED INDICATOR. TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P473-B4 AND P119-1 P473-B3 AND P119-2. REPAIR WIRE. GO TO PARA 8-3-1.
NO
CHECK FOR 5 VDC BETWEEN GROUND AND TB1-37-C. IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN: A326J6-B4 AND TB1-37-C A326J6-B3 AND TB1-37-J REPAIR WIRE/REPLACE RESISTOR R8 (TM 55-1520-238-23). GO TO PARA 8-3-1.
NO
REFER TO CHAPTERR 9 TO TROUBLESHOOT PILOT EDGE-LIGHTING.

END OF TASK

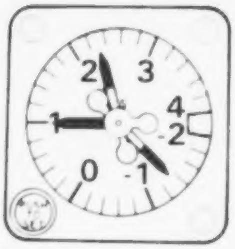
8-3-8. PILOT ACCELEROMETER INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-3-6)

Personnel Required: (para 8-3-6)

References: (para 8-3-6)

Equipment Conditions: (para 8-3-6)

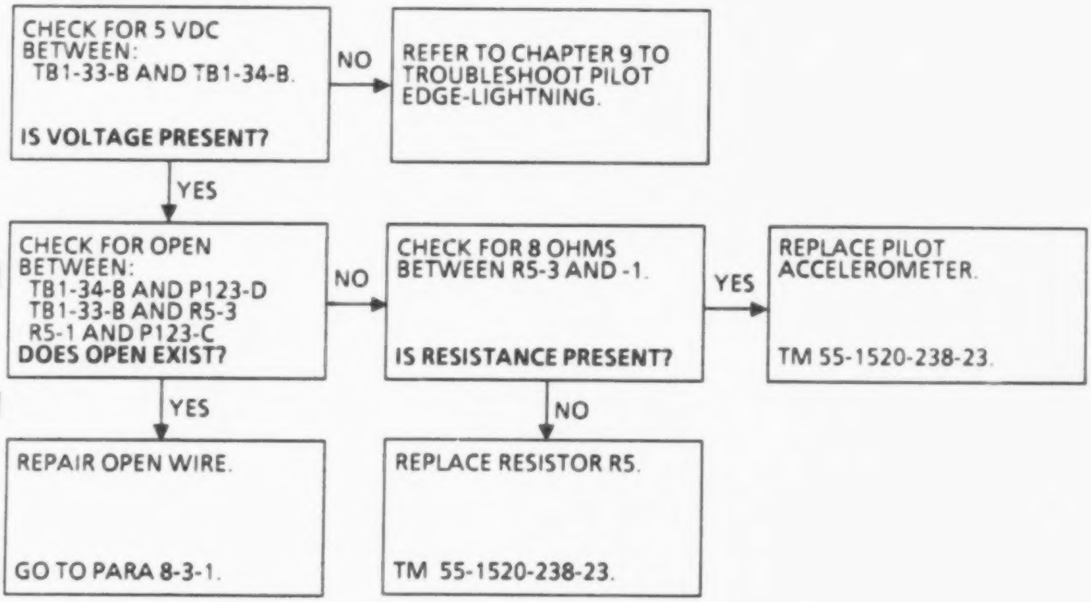


PILOT ACCELEROMETER INDICATO

MM04/1-512-1

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR 5 VDC BETWEEN: TB1-33-B AND TB1-34-B.
IS VOLTAGE PRESENT?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE-LIGHTNING.
YES
CHECK FOR OPEN BETWEEN: TB1-34-B AND P123-D TB1-33-B AND R5-3 R5-1 AND P123-C
DOES OPEN EXIST?
NO
CHECK FOR 8 OHMS BETWEEN R5-3 AND -1.
IS RESISTANCE PRESENT?
YES
REPLACE PILOT ACCELEROMETER.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-3-1.
NO
REPLACE RESISTOR R5.
TM 55-1520-238-23.

END OF TASK

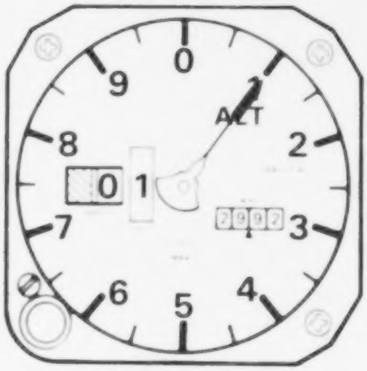
8-3-9. PILOT BAROMETRIC ALTIMETER EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-3-6)

Personnel Required: (para 8-3-6)

References: (para 8-3-6)

Equipment Conditions: (para 8-3-6)

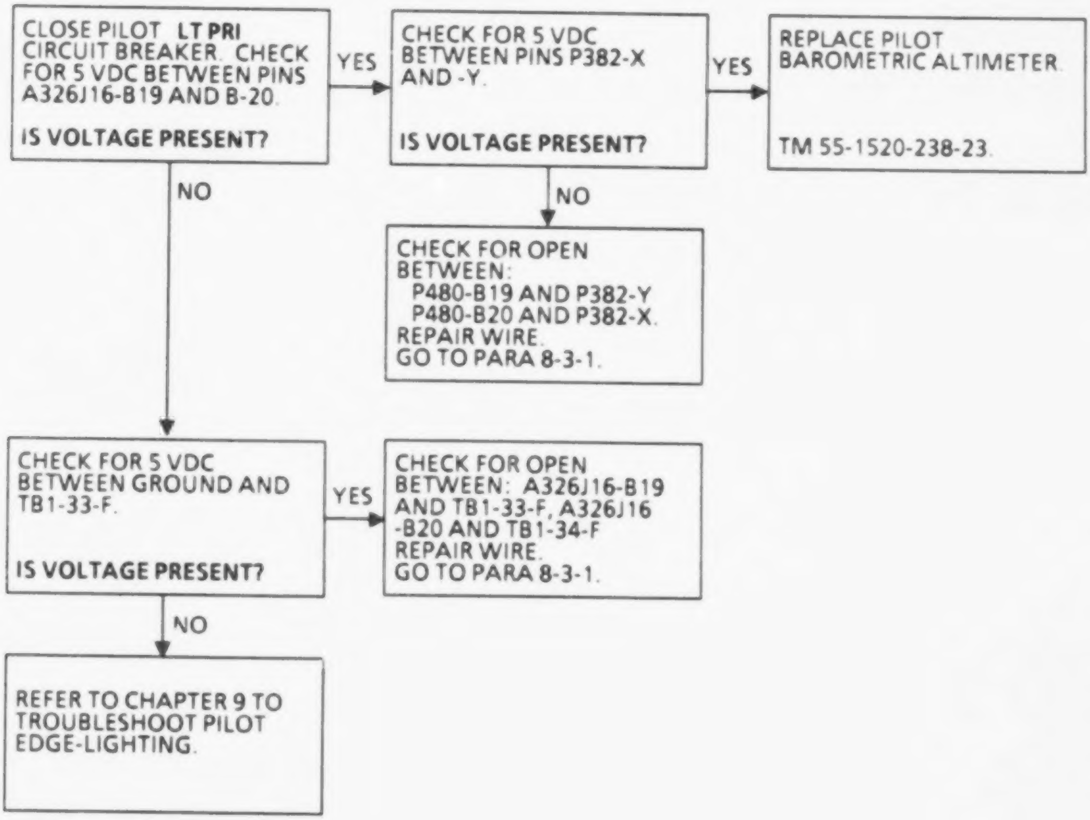


PILOT BAROMETERIC ALTIMETER

MM04/1-512-2A

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CLOSE PILOT **LT PRI** CIRCUIT BREAKER. CHECK FOR 5 VDC BETWEEN PINS A326J16-B19 AND B-20.

IS VOLTAGE PRESENT?

CHECK FOR 5 VDC BETWEEN PINS P382-X AND -Y.

IS VOLTAGE PRESENT?

REPLACE PILOT BAROMETRIC ALTIMETER.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P480-B19 AND P382-Y
P480-B20 AND P382-X.
REPAIR WIRE.
GO TO PARA 8-3-1.

CHECK FOR 5 VDC BETWEEN GROUND AND TB1-33-F.

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN: A326J16-B19 AND TB1-33-F, A326J16-B20 AND TB1-34-F
REPAIR WIRE.
GO TO PARA 8-3-1.

REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE-LIGHTING.

END OF TASK

8-3-10. PILOT VERTICAL SPEED INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Electronic Equipment Maintenance	5180-00-234-8913
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

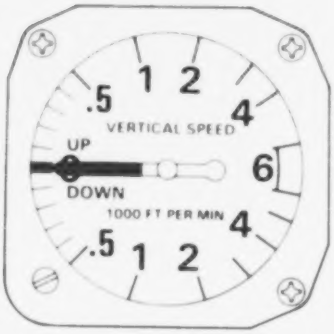
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Nontransparent barrier removed

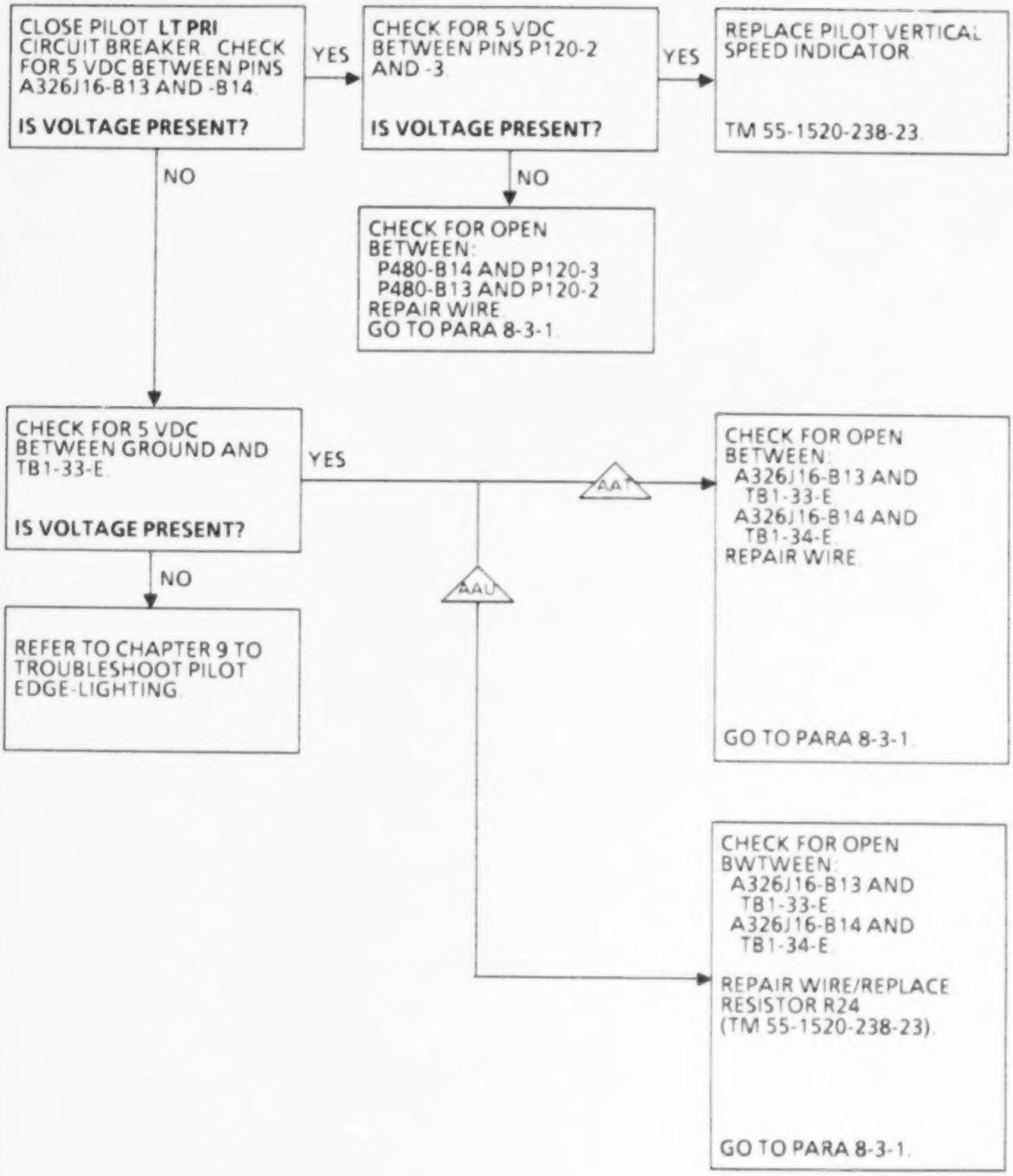


PILOT VERTICAL SPEED INDICATOR

MM04/1-514

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CLOSE PILOT **LT PRI** CIRCUIT BREAKER. CHECK FOR 5 VDC BETWEEN PINS A326J16-B13 AND -B14.

IS VOLTAGE PRESENT?

CHECK FOR 5 VDC BETWEEN PINS P120-2 AND -3.

IS VOLTAGE PRESENT?

REPLACE PILOT VERTICAL SPEED INDICATOR.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P480-B14 AND P120-3
P480-B13 AND P120-2
REPAIR WIRE.
GO TO PARA 8-3-1.

CHECK FOR 5 VDC BETWEEN GROUND AND TB1-33-E.

IS VOLTAGE PRESENT?

REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE-LIGHTING.

CHECK FOR OPEN BETWEEN:
A326J16-B13 AND TB1-33-E.
A326J16-B14 AND TB1-34-E.
REPAIR WIRE.

GO TO PARA 8-3-1.

CHECK FOR OPEN BWTWEEN:
A326J16-B13 AND TB1-33-E.
A326J16-B14 AND TB1-34-E.

REPAIR WIRE/REPLACE RESISTOR R24 (TM 55-1520-238-23).

GO TO PARA 8-3-1.

END OF TASK

8-3-10A. PILOT BAROMETRIC ALTIMETER - INTERNAL VIBRATOR IS NOT HEARD

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Tool Kit, Electronic Equipment Maintenance	5180-00-234-8913
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

68F10 Aircraft Electrician

References:

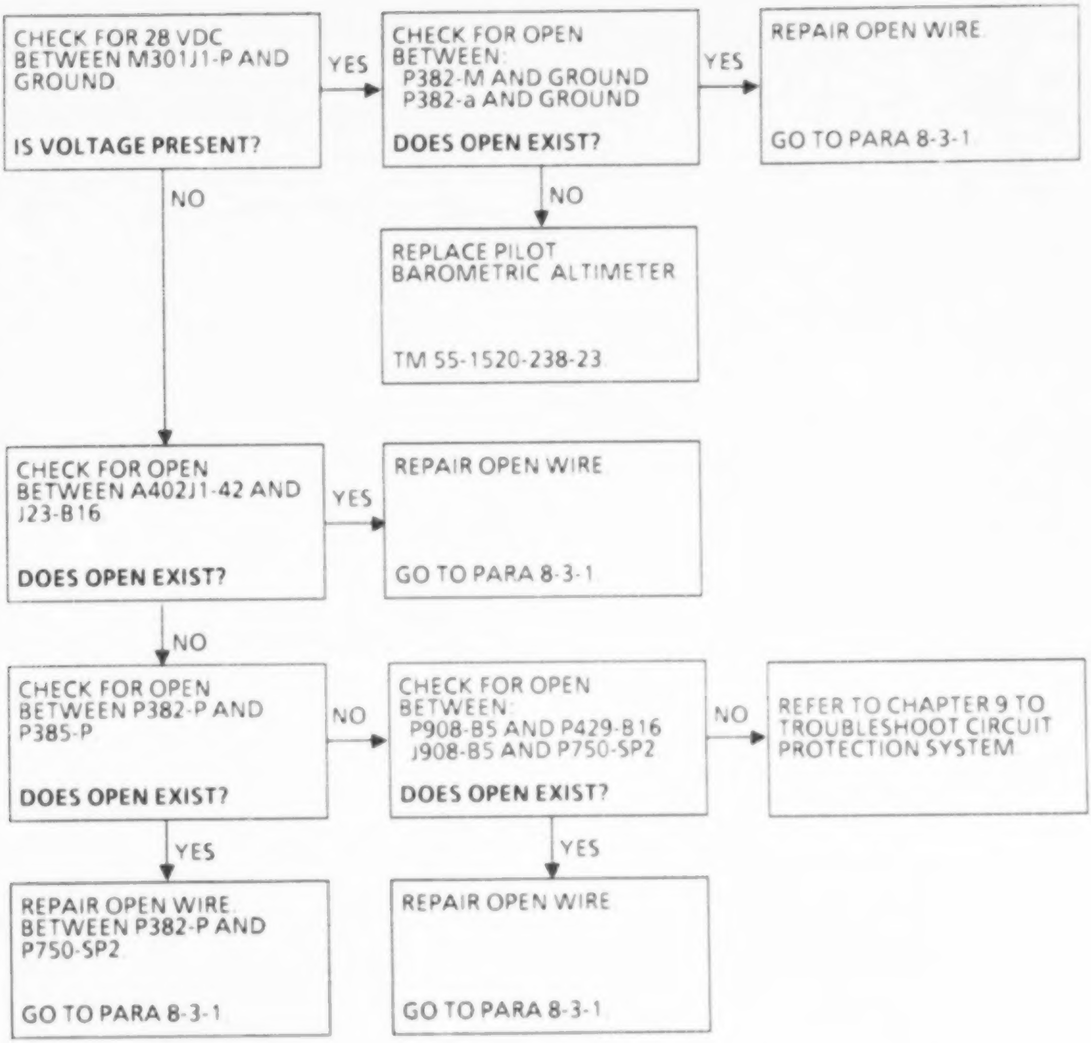
TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical
	Nontransparent barrier removed

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


CHECK FOR 28 VDC BETWEEN M301J1-P AND GROUND
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN:
P382-M AND GROUND
P382-a AND GROUND
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE.
GO TO PARA 8-3-1
NO
REPLACE PILOT BAROMETRIC ALTIMETER
TM 55-1520-238-23
NO
CHECK FOR OPEN BETWEEN A402J1-42 AND J23-B16
DOES OPEN EXIST?
YES
REPAIR OPEN WIRE
GO TO PARA 8-3-1
NO
CHECK FOR OPEN BETWEEN P382-P AND P385-P
DOES OPEN EXIST?
NO
CHECK FOR OPEN BETWEEN:
P908-B5 AND P429-B16
J908-B5 AND P750-SP2
DOES OPEN EXIST?
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.
YES
REPAIR OPEN WIRE. BETWEEN P382-P AND P750-SP2
GO TO PARA 8-3-1
YES
REPAIR OPEN WIRE
GO TO PARA 8-3-1

END OF TASK

8-3-10B. CPG BAROMETRIC ALTIMETER - INTERNAL VIBRATOR IS NOT HEARD

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Personnel Required:

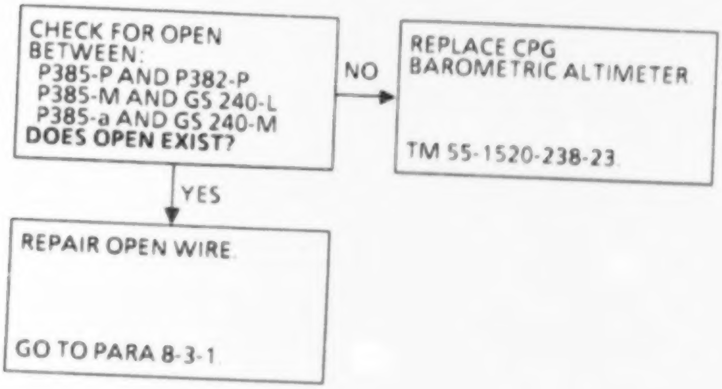
68F10 Aircraft Electrician

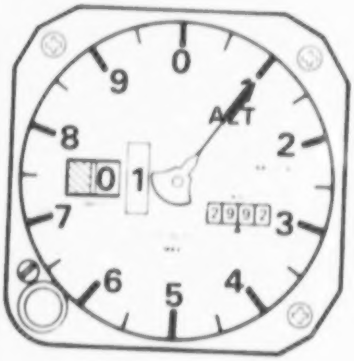
References:

TM 55-1520-238-23

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed


CHECK FOR OPEN BETWEEN:
P385-P AND P382-P
P385-M AND GS 240-L
P385-a AND GS 240-M
DOES OPEN EXIST?
NO
REPLACE CPG BAROMETRIC ALTIMETER.
TM 55-1520-238-23.
YES
REPAIR OPEN WIRE.
GO TO PARA 8-3-1.


0
1
2
3
4
5
6
7
8
9
ALT
0
1
2992

BAROMETRIC ALTIMETER

MM04/1-1417

END OF TASK

8-3-10C. PILOT MAGNETIC COMPASS LAMP - DOES NOT LIGHT

Tools: (para 8-3-10B)

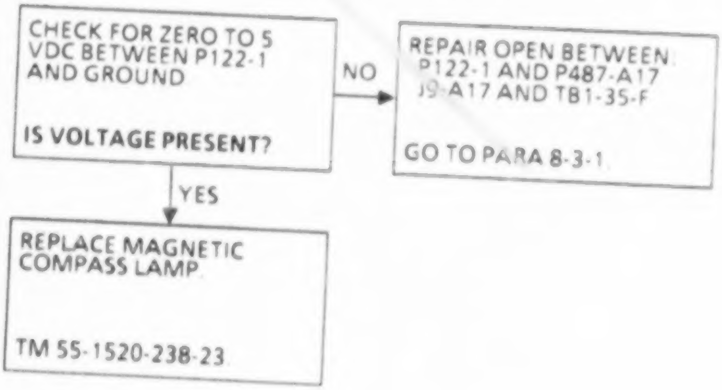
Personnel Required: (para 8-3-10B)

References: (para 8-3-10B)

Equipment Conditions: (para 8-3-10B)

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



CHECK FOR ZERO TO 5 VDC BETWEEN P122-1 AND GROUND

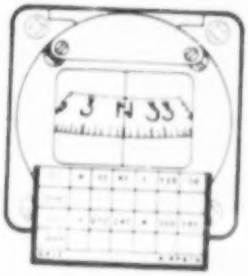
IS VOLTAGE PRESENT?

REPAIR OPEN BETWEEN P122-1 AND P487-A17 J9-A17 AND TB1-35-F

GO TO PARA 8-3-1

REPLACE MAGNETIC COMPASS LAMP

TM 55-1520-238-23



MAGNETIC COMPASS

MM04/1-1418

END OF TASK

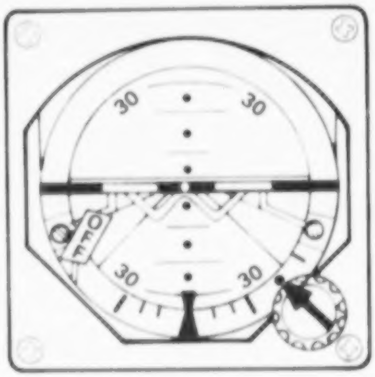
8-3-11. PILOT STANDBY ATTITUDE INDICATOR EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-3-10B)

Personnel Required: (para 8-3-10B)

References: (para 8-3-10B)

Equipment Conditions: (para 8-3-10B)

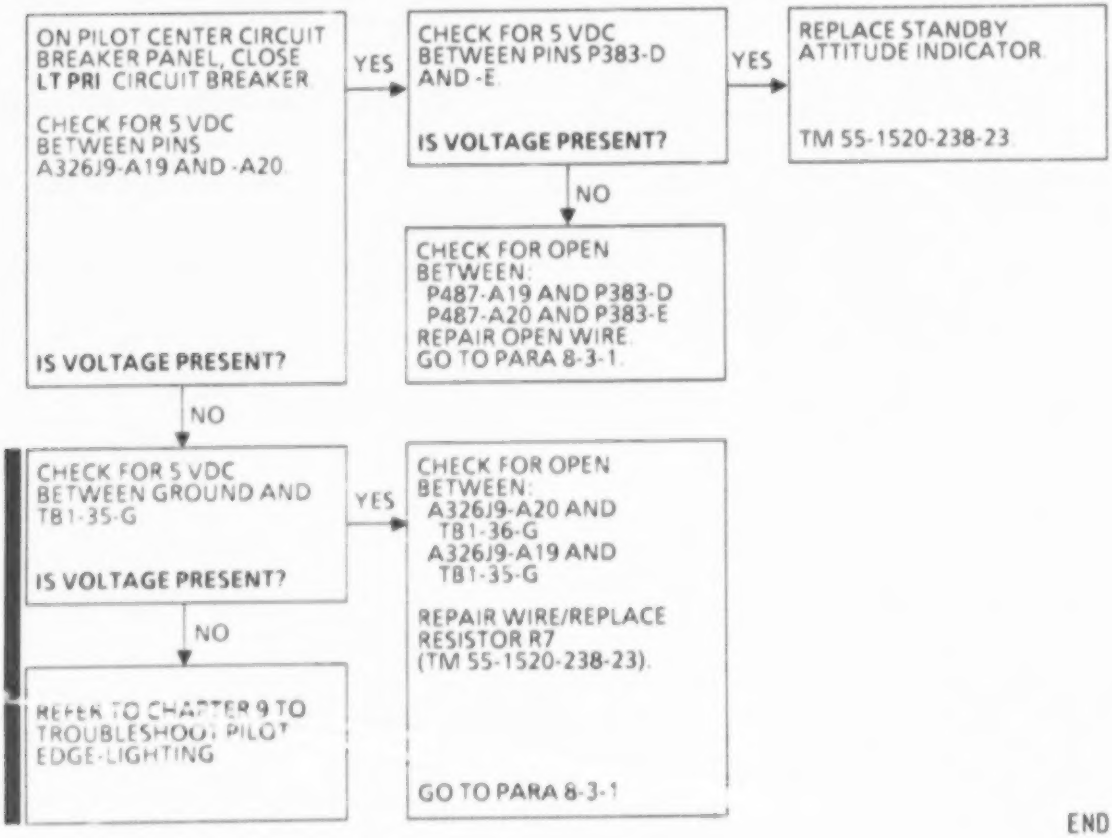


PILOT STANDBY ATTITUDE INDICATOR

MM04/1-538A

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.



ON PILOT CENTER CIRCUIT BREAKER PANEL, CLOSE LT PRI CIRCUIT BREAKER.

CHECK FOR 5 VDC BETWEEN PINS A326J9-A19 AND -A20.

IS VOLTAGE PRESENT?

CHECK FOR 5 VDC BETWEEN PINS P383-D AND -E.

IS VOLTAGE PRESENT?

REPLACE STANDBY ATTITUDE INDICATOR.

TM 55-1520-238-23.

CHECK FOR OPEN BETWEEN:
P487-A19 AND P383-D
P487-A20 AND P383-E
REPAIR OPEN WIRE.
GO TO PARA 8-3-1.

CHECK FOR 5 VDC BETWEEN GROUND AND TB1-35-G

IS VOLTAGE PRESENT?

CHECK FOR OPEN BETWEEN:
A326J9-A20 AND TB1-36-G
A326J9-A19 AND TB1-35-G

REPAIR WIRE/REPLACE RESISTOR R7 (TM 55-1520-238-23).

GO TO PARA 8-3-1

REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE-LIGHTING

END OF TASK

8-3-12. PILOT STANDBY ATTITUDE INDICATOR OFF FLAG - IS VISIBLE WITH ELECTRICAL POWER ON AND INDICATOR UNCAGED

Tools: (para 8-3-10B)

Personnel Required: (para 8-3-10B)

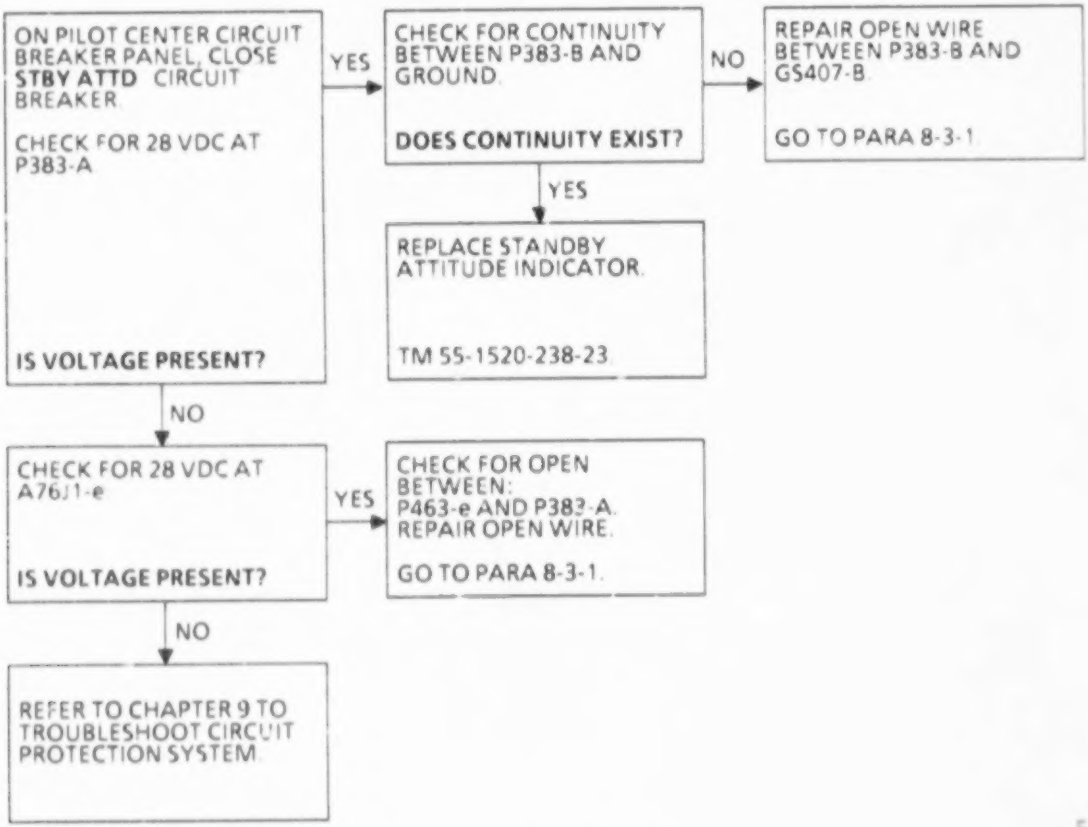
References: (para 8-3-10B)

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON PILOT CENTER CIRCUIT BREAKER PANEL, CLOSE STBY ATTD CIRCUIT BREAKER.
CHECK FOR 28 VDC AT P383-A.
IS VOLTAGE PRESENT?
YES
CHECK FOR CONTINUITY BETWEEN P383-B AND GROUND.
DOES CONTINUITY EXIST?
NO
REPAIR OPEN WIRE BETWEEN P383-B AND GS407-B.
GO TO PARA 8-3-1.
YES
REPLACE STANDBY ATTITUDE INDICATOR.
TM 55-1520-238-23.
NO
CHECK FOR 28 VDC AT A76J1-e.
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN: P463-e AND P383-A. REPAIR OPEN WIRE.
GO TO PARA 8-3-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CIRCUIT PROTECTION SYSTEM.

END OF TASK

8-4-1. MISCELLANEOUS INSTRUMENTS - OPERATIONAL CHECK

Personnel Required:

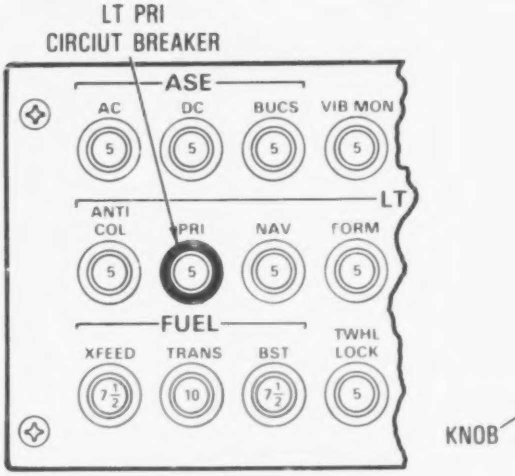
68F10 Aircraft Electrician

References:

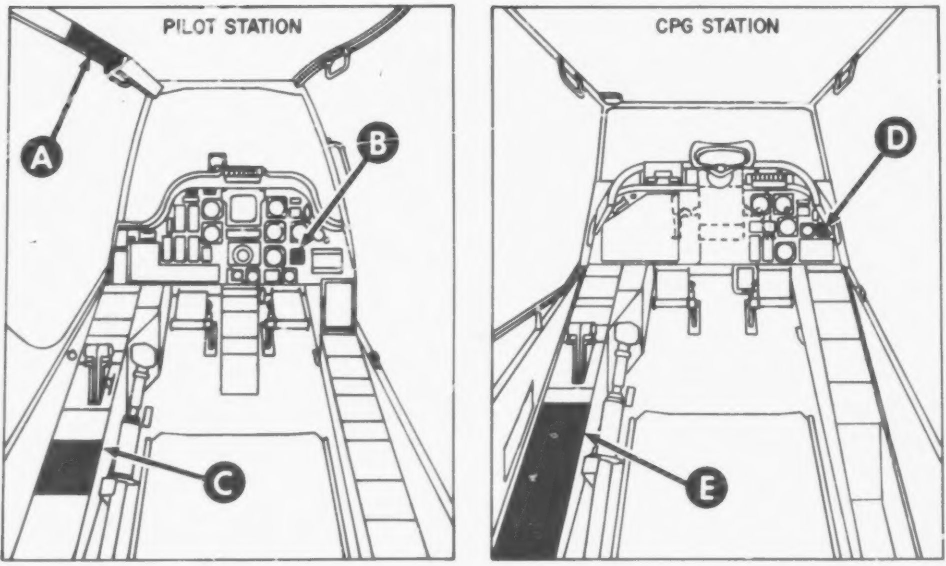
TM 55-1520-238-23

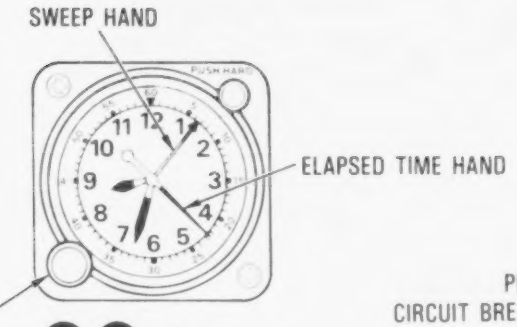
Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

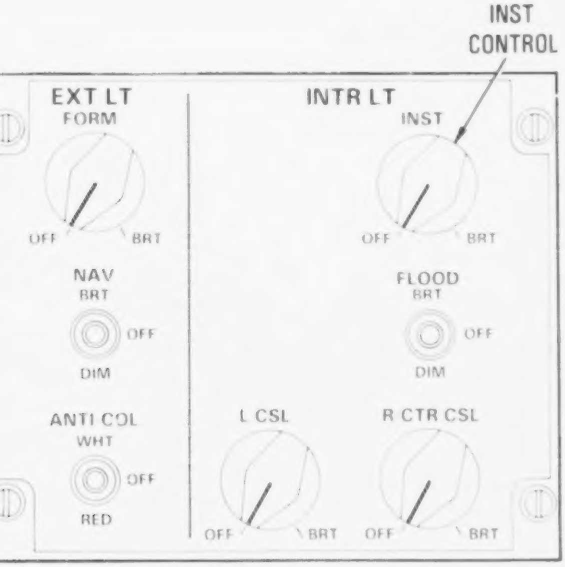

LT PRI
CIRCIUT BREAKER
ASE
AC
DC
BUCS
VIB MON
5
5
5
5
LT
ANTI COL
PRI
NAV
FORM
5
5
5
5
FUEL
XFEED
TRANS
BST
TWHL LOCK
7 1/2
10
7 1/2
5
KNOB

A PILOT CENTER CIRCUIT BREAKER PANEL

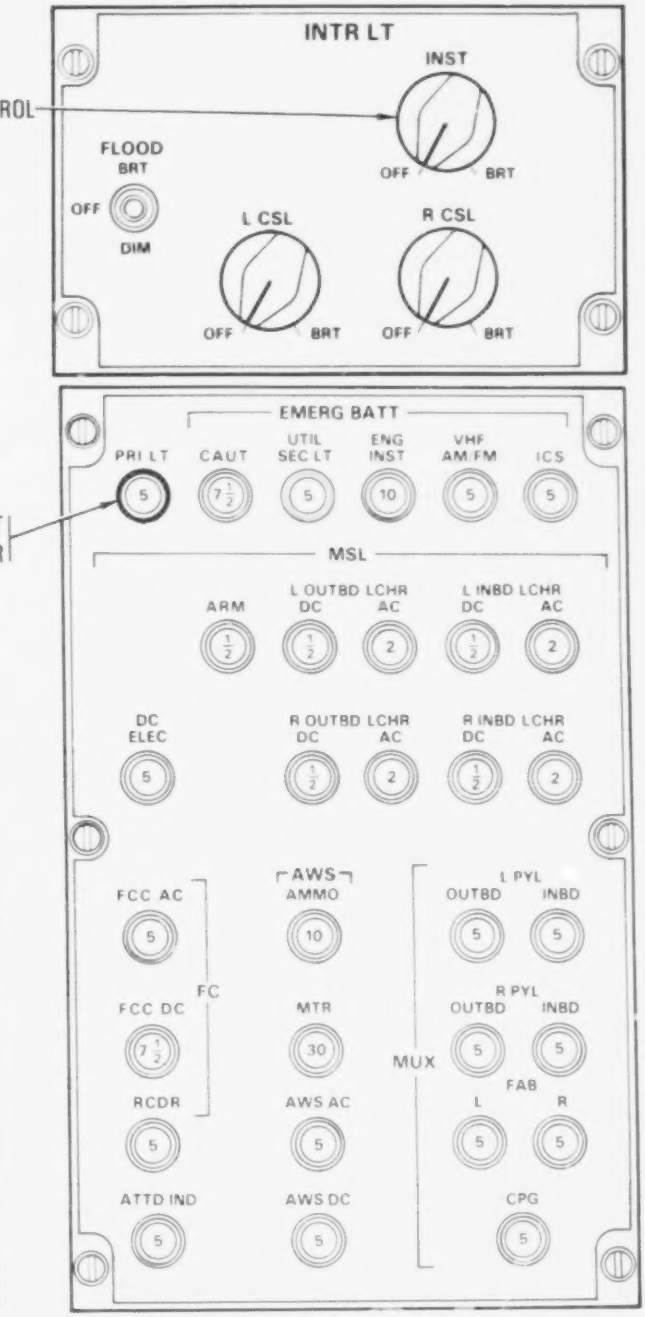

PILOT STATION
A
B
C
CPG STATION
D
E


SWEEP HAND
PUSH HARD
ELAPSED TIME HAND

B D CLOCK


INST
CONTROL
EXT LT
FORM
OFF
BRT
NAV
BRT
OFF
DIM
ANTI COL
WHT
OFF
RED
INTR LT
INST
OFF
BRT
FLOOD
BRT
OFF
DIM
L CSL
R CTR CSL
OFF
BRT
OFF
BRT

C PILOT INTR LT PANEL


INTR LT
INST
INST CONTROL
FLOOD
BRT
OFF
DIM
OFF
BRT
L CSL
R CSL
OFF
BRT
OFF
BRT
EMERG BATT
PRI LT
CAUT
UTIL SEC LT
ENG INST
VHF AM/FM
ICS
5
7 1/2
5
10
5
5
PRI LT
CIRCUIT BREAKER
MSL
ARM
L OUTBD LCHR
DC
AC
L INBD LCHR
DC
AC
1/2
1/2
2
1/2
2
DC ELEC
5
R OUTBD LCHR
DC
AC
R INBD LCHR
DC
AC
1/2
2
1/2
2
FCC AC
5
AWS
AMMO
10
L PYL
OUTBD
INBD
5
5
FC
FCC DC
7 1/2
MTR
30
R PYL
OUTBD
INBD
5
5
MUX
FAB
RCDR
5
AWS AC
5
L
R
5
5
ATTD IND
5
AWS DC
5
CPG
5

E CPG INTR LT PANEL AND CIRCUIT BREAKER PANEL

MM04/1-530A

8-4-1. MISCELLANEOUS INSTRUMENTS - OPERATIONAL CHECK (cont)

A. Perform visual check of pilot and CPG check (TM 55-1520-238-23).

B. Complete the following operational check:

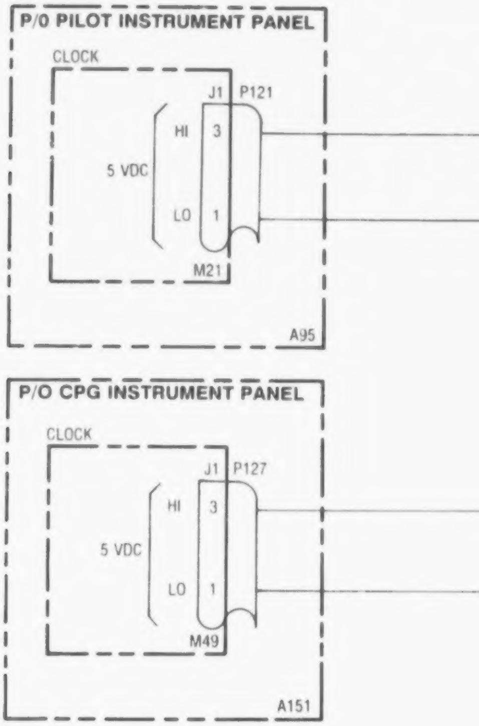
TASK	RESULT
1. Enter pilot station and check that **LT PRI** circuit breaker is closed on pilot center circuit breaker panel.	
2. Turn **INST** control on pilot **INTR LT** Panel to **BRT**.	If pilot clock edge-lighting does not light, go to para 8-4-4.
3. If pilot clock is not running, wind clock by turning knob on face of clock.	If pilot clock does not run after winding, replace clock (TM 55-1520-238-23).
4. Set pilot clock time by pulling and turning knob.	If pilot clock hour and minute hands will not move, replace clock (TM 55-1520-238-23).
5. Push knob three times.	If pushing knob first time on pilot clock does not reset sweep hand and elapse time hand (to top of clock face), replace pilot clock (TM 55-1520-238-23). If pushing knob second time on pilot clock does not start hands moving, replace pilot clock (TM 55-1520-238-23). If pushing knob third time on pilot clock does not stop hands from moving, replace pilot clock (TM 55-1520-238-23).

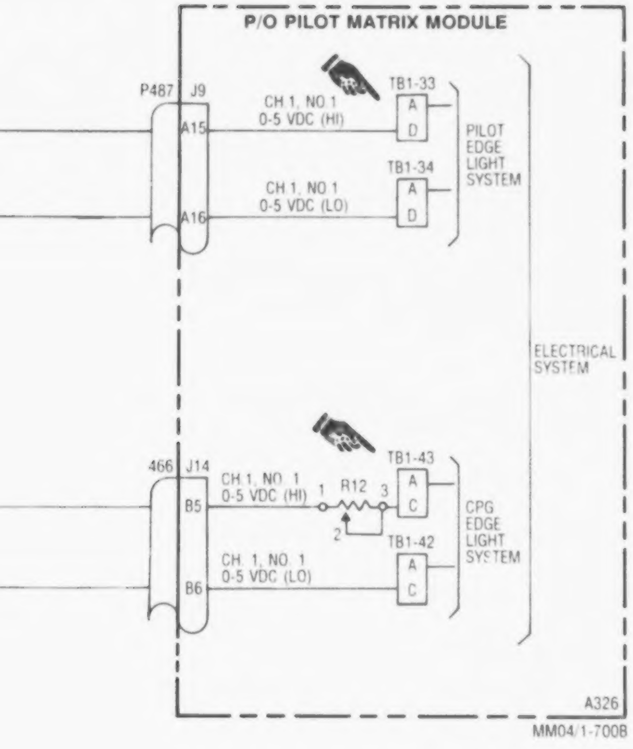
TASK	RESULT
6. Turn **INST** control on pilot **INTR LT** panel to **OFF**.	
7. Enter CPG station and close **PRI LT** circuit breaker on CPG circuit breaker panel.	
8. Turn **INST** control on CPG **INTR LT** panel to **BRT**.	If CPG clock edge-lighting does not light, go to para 8-4-5.
9. If CPG clock is not running, wind clock by turning knob on face of clock.	If CPG clock does not run after winding, replace clock (TM 55-1520-238-23).
10. Set CPG clock time by pulling and turning knob.	If CPG clock hour and minute hand will not move, replace clock (TM 55-1520-238-23).
11. Push CPG clock knob three times.	If pushing knob first time on CPG clock does not reset sweep hand and elapse time hand (to top of clock face), replace CPG clock (TM 55-1520-238-23). If pushing knob second time on CPG clock does not start hands moving, replace CPG clock (TM 55-1520-238-23). If pushing knob third time on CPG clock does not stop hands from moving, replace CPG clock (TM 55-1520-238-23).
12. Turn **INST** control on CPG **INTR LT** panel to **OFF**.	

C. Turn off and disconnect GPU from helicopter (TM 55-1520-238-23).

END OF TASK

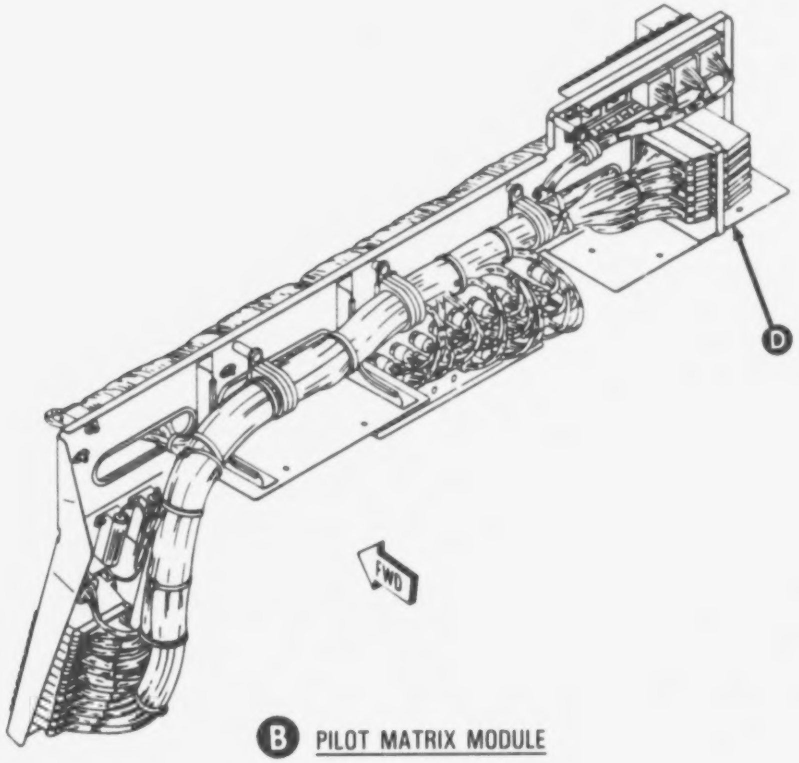
8-4-2. MISCELLANEOUS INSTRUMENTS - INTERCONNECTION DIAGRAM


P/0 PILOT INSTRUMENT PANEL
CLOCK
J1
P121
HI
3
5 VDC
LO
1
M21
A95
P/O CPG INSTRUMENT PANEL
CLOCK
J1
P127
HI
3
5 VDC
LO
1
M49
A151

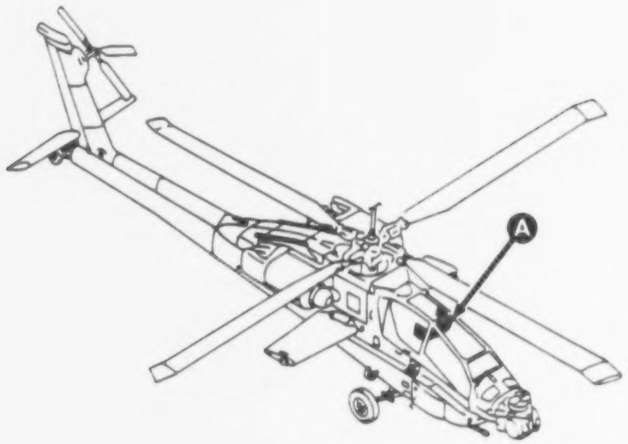

P/O PILOT MATRIX MODULE
P487
J9
A15
A16
CH 1, NO 1
0-5 VDC (HI)
CH 1, NO 1
0-5 VDC (LO)
TB1-33
A
D
TB1-34
A
D
PILOT
EDGE
LIGHT
SYSTEM
ELECTRICAL
SYSTEM
466
J14
B5
B6
CH 1, NO 1
0-5 VDC (HI)
1
R12
3
2
TB1-43
A
C
TB1-42
A
C
CH 1, NO 1
0-5 VDC (LO)
CPG
EDGE
LIGHT
SYSTEM
A326
MM04/1-700B

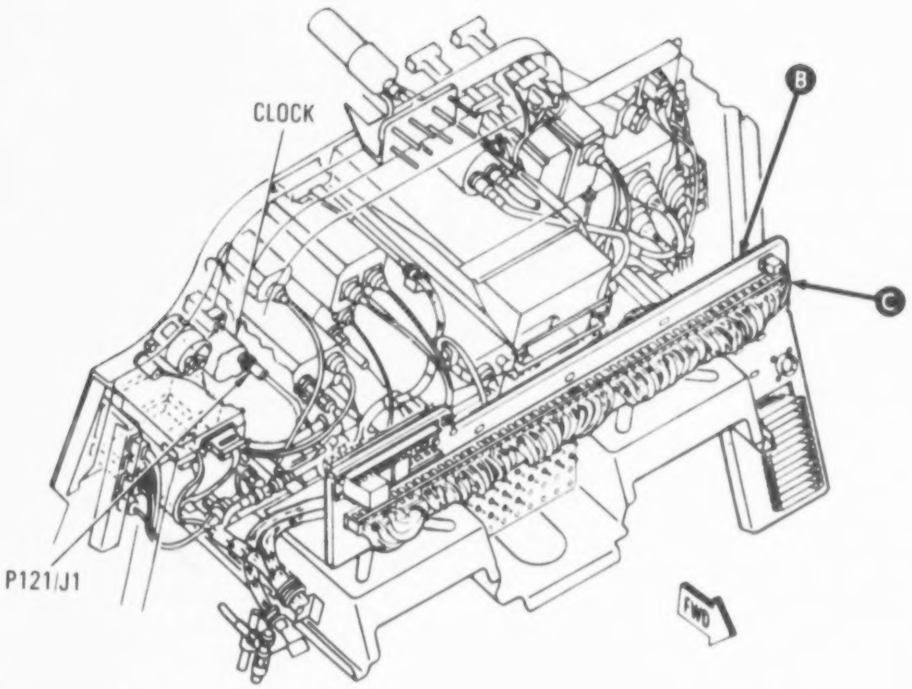
END OF TASK

8-4-3. MISCELLANEOUS INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION

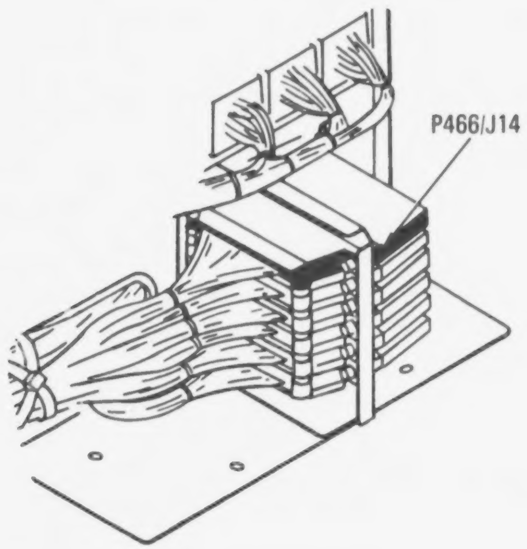


B PILOT MATRIX MODULE

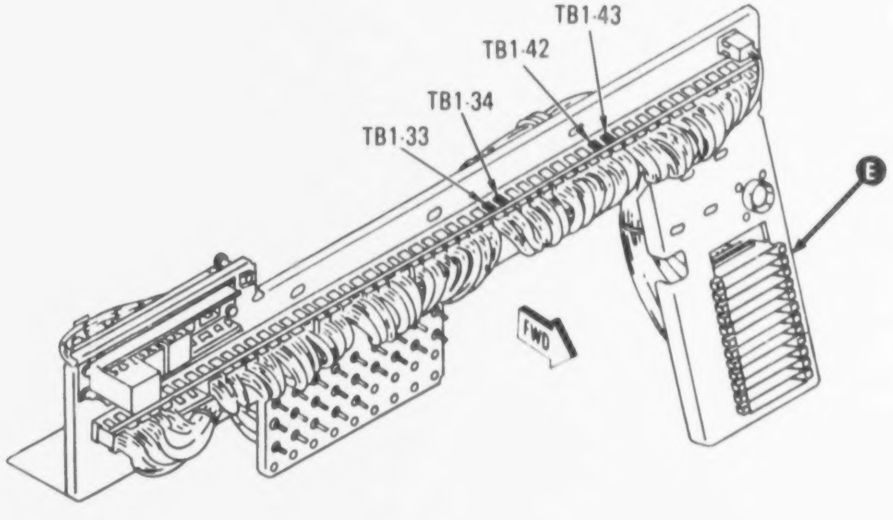



CLOCK
B
C
P121/J1
FWD

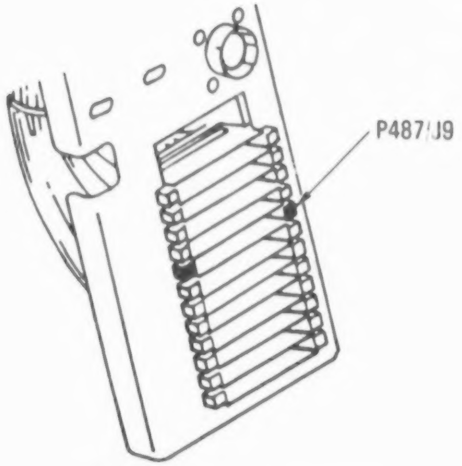
A PILOT INSTRUMENT PANEL



D REAR CONNECTORS


TB1-43
TB1-42
TB1-34
TB1-33
E
FWD

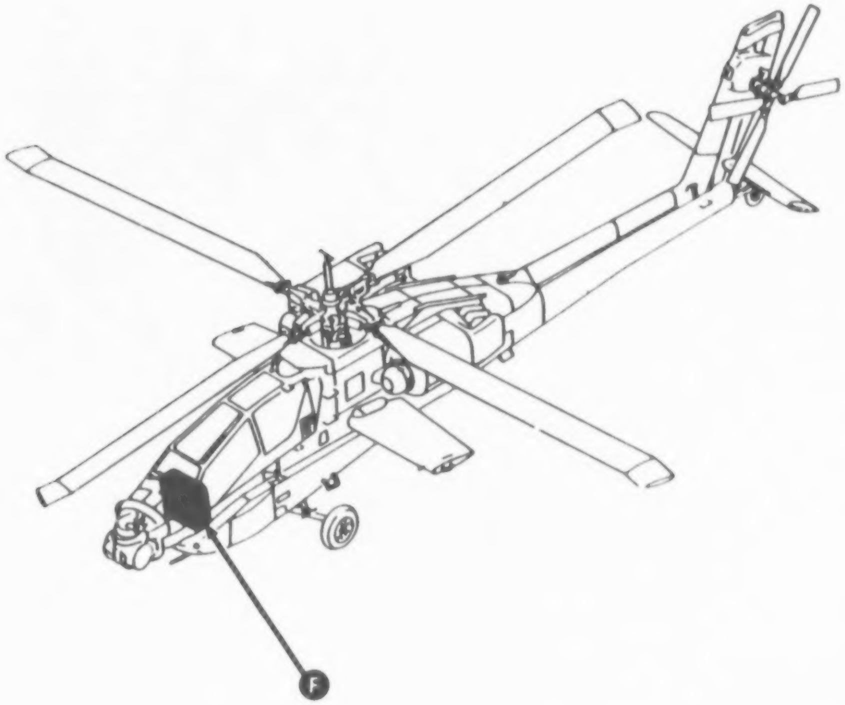
C PILOT MATRIX MODULE

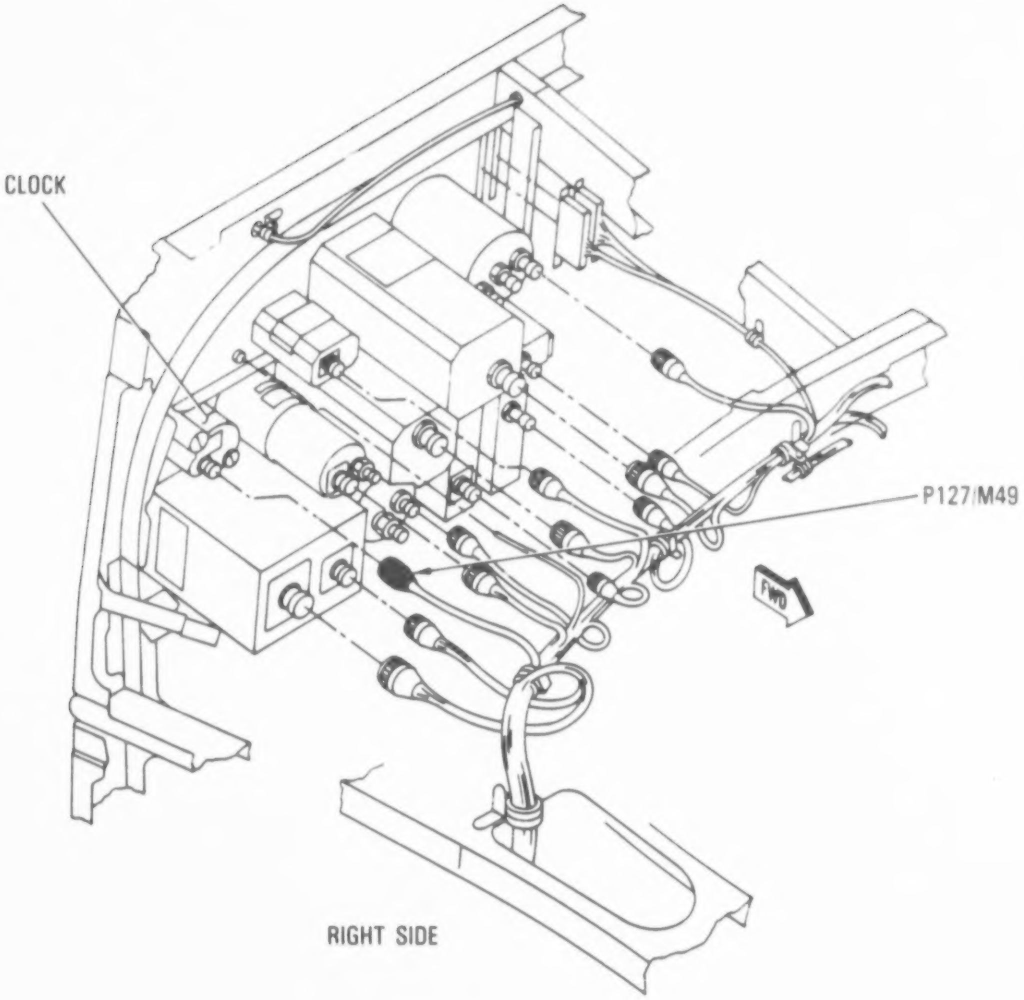


E FRONT CONNECTORS

MM04/1-1286-1A

8-4-3. MISCELLANEOUS INSTRUMENTS - ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (cont)




CLOCK
P127/M49
FWD
RIGHT SIDE

Ⓕ CPG INSTRUMENT PANEL

MM04/1-1286-2

8-4-4. PILOT CLOCK EDGE-LIGHTING - DOES NOT LIGHT

Tools:

Nomenclature	Part Number (NSN)
Tool Kit, Electrical Repairer's	5180-00-323-4915
Multimeter, AN/URM-105C	6625-00-999-6282

Equipment Conditions:

Ref	Condition
TM 55-1520-238-23	Helicopter safed
	External power application - Electrical

Personnel Required:

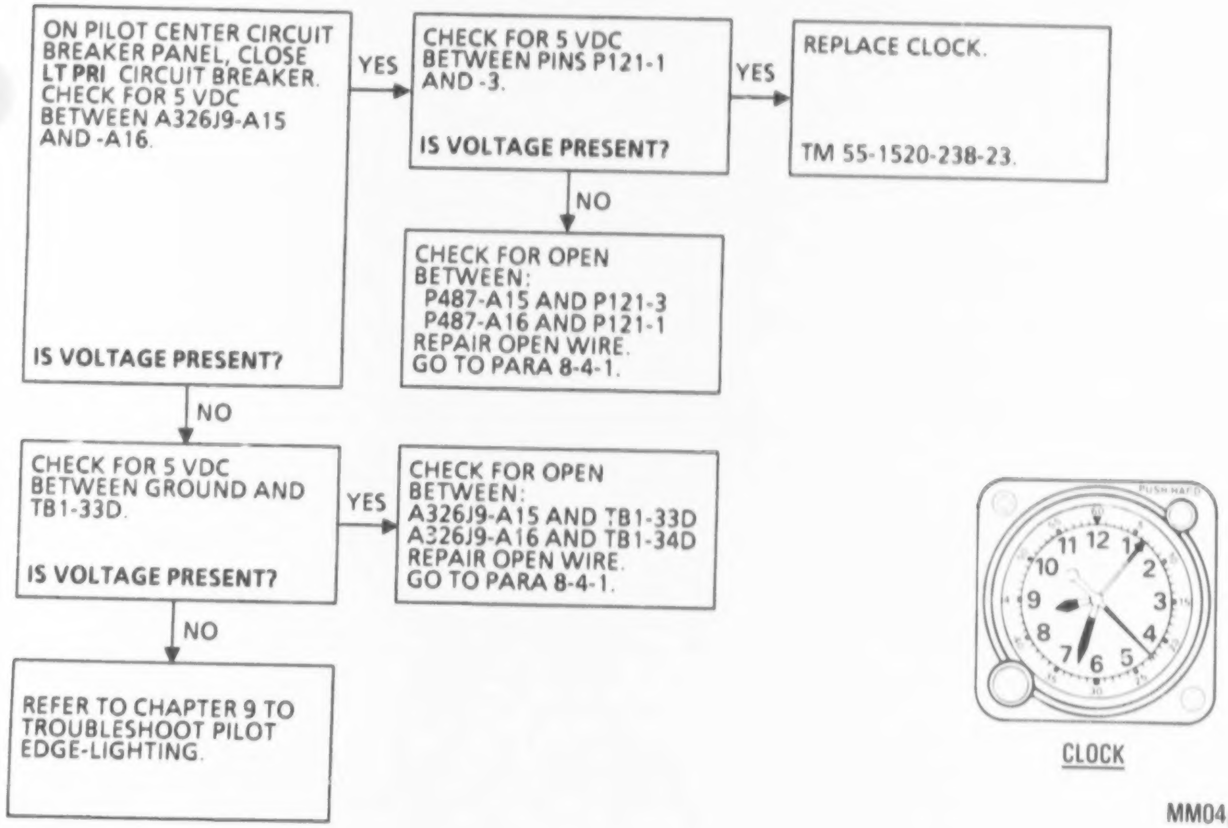
68F10 Aircraft Electrician

References:

TM 55-1520-238-23

WARNING

Turn off power before disconnecting or reconnecting wires and connectors. High current 28 VDC and/or 115 VAC are present. Failure to do so could result in death or serious injury.


ON PILOT CENTER CIRCUIT BREAKER PANEL, CLOSE LT PRI CIRCUIT BREAKER. CHECK FOR 5 VDC BETWEEN A326J9-A15 AND -A16.
IS VOLTAGE PRESENT?
YES
CHECK FOR 5 VDC BETWEEN PINS P121-1 AND -3.
IS VOLTAGE PRESENT?
YES
REPLACE CLOCK.
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P487-A15 AND P121-3 P487-A16 AND P121-1 REPAIR OPEN WIRE. GO TO PARA 8-4-1.
NO
CHECK FOR 5 VDC BETWEEN GROUND AND TB1-33D.
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN: A326J9-A15 AND TB1-33D A326J9-A16 AND TB1-34D REPAIR OPEN WIRE. GO TO PARA 8-4-1.
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT PILOT EDGE-LIGHTING.

PUSH-HACK
12
1
2
3
4
5
6
7
8
9
10
11

CLOCK

MM04/1-533A

END OF TASK

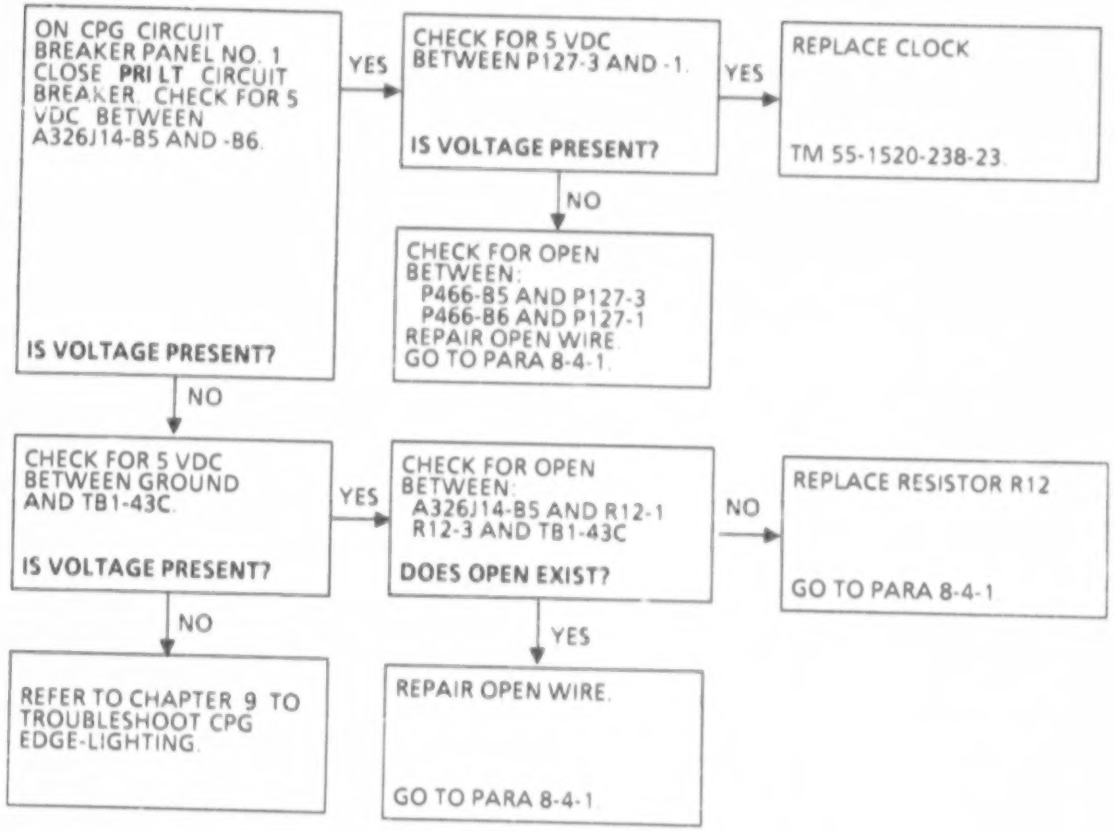
8-4-5. CPG CLOCK EDGE-LIGHTING - DOES NOT LIGHT

Tools: (para 8-4-4)

Personnel Required: (para 8-4-4)

References: (para 8-4-4)

Equipment Conditions: (para 8-4-4)


ON CPG CIRCUIT BREAKER PANEL NO. 1 CLOSE PRI LT CIRCUIT BREAKER. CHECK FOR 5 VDC BETWEEN A326J14-B5 AND -B6.
IS VOLTAGE PRESENT?
YES
CHECK FOR 5 VDC BETWEEN P127-3 AND -1.
IS VOLTAGE PRESENT?
YES
REPLACE CLOCK
TM 55-1520-238-23.
NO
CHECK FOR OPEN BETWEEN: P466-B5 AND P127-3 P466-B6 AND P127-1 REPAIR OPEN WIRE. GO TO PARA 8-4-1.
NO
CHECK FOR 5 VDC BETWEEN GROUND AND TB1-43C.
IS VOLTAGE PRESENT?
YES
CHECK FOR OPEN BETWEEN: A326J14-B5 AND R12-1 R12-3 AND TB1-43C
DOES OPEN EXIST?
NO
REPLACE RESISTOR R12
GO TO PARA 8-4-1
YES
REPAIR OPEN WIRE.
GO TO PARA 8-4-1
NO
REFER TO CHAPTER 9 TO TROUBLESHOOT CPG EDGE-LIGHTING.

END OF TASK

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

MILDRED E. HEDBERG
Brigadier General, United States Army
The Adjutant General

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COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER TM 55-1520-238-T-1	PUBLICATION DATE 15 Dec 85	PUBLICATION TITLE AVUM and AVIM Trouble-shooting Manual for Army Model AH-64A Helicopter

BE EXACT . . . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.
125	line	20		I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket bit it doesn't fit. Supply says I got What I ordered, so the NSN is Wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

TEAR ALONG PERFORATED LINE

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U.S.MAIL

COMMANDER
U S ARMY AVIATION SYSTEMS COMMAND
ATTN: AMSAV-MPSD
4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120-1798

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2,
1 Nov 80

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

TEAR ALONG PERFORATED LINE

DEPARTMENT OF THE ARMY

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OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C